DECISION RECORD
Lance Oil and Gas Company, Inc., Sahara Plan of Development (POD)
Environmental Assessment (EA), WY-070-EA13-72
Bureau of Land Management, Buffalo Field Office, Wyoming

DECISION. The BLM approves Lance Oil and Gas Company, Inc.Sahara plan of development 21 gas and oil and gas well applications for permit to drill (APDs) as described in Alternative B of the environmental assessment (EA), WY-070-EA13-72. This approval includes the wells' support facilities.

Compliance. This decision complies with:

- Federal Land Policy and Management Act of 1976 (FLPMA) (43 USC 1701); DOI Order 3310.
- Mineral Leasing Act of 1920 (MLA) (30 U.S.C. 181); including the Onshore Oil and Gas Orders.
- National Environmental Policy Act of 1969 (NEPA) (42 USC 4321).
- National Historic Preservation Act of 1966 (NHPA) (16 USC 470).
- Buffalo Resource Management Plan (RMP) 1985 and Amendments.

BLM summarizes the details of the approval of Alternative B, below. The EA includes the project description, including specific changes made at the onsites, and site-specific mitigation measures.

Wells List. BLM approves the following APDs and support facilities; noting well and pad names and numbers, surface hole, lateral, and bottom hole leases (SHL/LL/BHL):

#	"Mojave Fed" Well #	"Mojave Fed" Pad #	Twp	Rng	Sec	Qtr	SHL	LL	BHL
1	4277-2-41F-H	4277-11-31	42N	77W	11	NWNE	WYW147342	FEE	WYW160419
2	4277-11-44F-H								WYW146828
3	4277-14-34F-H	4277-14-41	42N	77W	14	NENE	WYW146828		WYW146828
4	4277-22-41F-H	4277-27-31	42N	77W	27	NWNE	WYW146831		WYW152974
5	4277-27-44F-H								WYW147342
6	4277-27-44SH-H								
7	4277-23-31F-H	4277-26-41	42N	77W	26	NENE	WYW128629	FEE	WYW146830
8	4277-26-34F-H							WYW146831	FEE
9	4377-5-11SH-H	4377-5-24	43N	77W	5	SESW	WYW146834		WYW146834
10	4377-8-34SH-H				8	NENW	WYW146836		WYW146836
11	*4377-6-31SH-H	*4377-6-44	43N	77W	6	SESE	WYW146834		FEE
12	*4377-6-31M-H								FEE
13	*4377-7-31SH-H	*4377-7-44	43N	77W	7	SESE	WYW146835		WYW146835
14	4377-9-24SH-H	4377-9-11	43N	77W	9	NWNW	WYW146837		WYW146837
15	4377-17-31SH-H	4377-17-44	43N	77W	17	SESE	WYW146838	FEE	WYW146838
16	4377-20-31SH-H	4377-20-44	43N	77W	20	SESE	WYW146840		FEE
17	4377-21-21SH-H	4377-28-31	43N	77W	28	NWNE	WYW146843		WYW146841
18	4377-21-21SX-H								
19	4377-28-44SH-H								WYW146843
20	4377-27-11SH-H	4377-27-34	43N	77W	27	SWSE	WYW146842	FEE, WYW50143	WYW146842
21	4377-34-44SH-H								WYW146845

*Three wells on 2 pads are on BLM surface. All others are on fee surface.

List of Approved Rights-of Way (ROW).

ROW Grant	ROW Action	Section	Twp	Rng	Lengths	Width
WYW-168397	Road	7, 8, 17	43N	77w	4,370'	NTE 50'
WYW-168402	Well Pad	2	42N	77W	2.060 acres	
Lengths and widths in feet. NTE – not to exceed					Acres of Disturbance 7.08 acres	

Limitations. There are no denials or deferrals. Also see the conditions of approval (COAs).

THE FINDING OF NO SIGNIFICANT IMPACT (FONSI). Analysis of Alternative B of the EA, WY-070-EA13-72 and the FONSI (incorporated here by reference) found Lance's proposal the Sahara POD will have no significant impacts on the human environment, beyond those described in the PRB FEIS. There is no requirement for an EIS.

COMMENT OR NEW INFORMATION SUMMARY. BLM publically posted the proposed APDs for 30 days, received no comments, and then internally scoped them. BLM received new information on Greater Sage-Grouse (GSG) including the 2012 population viability analysis for the Northeast Wyoming, and BLM Instruction Memorandum-2013-033, on reducing direct wildlife mortalities.

DECISION RATIONALE. BLM bases the decision authorizing the selected project on:

1. BLM and Lance included mitigation measures to reduce environmental impacts while meeting the project's need. For a complete description of all site-specific COAs see the COAs. The PRB FEIS analyzed and predicted that the PRB oil and gas development would have significant impacts to the region's GSG population. The impact of this development cumulatively contributes to the potential for local extirpation yet its effect is acceptable because it is outside priority habitats and is within the parameters of the PRB FEIS and ROD and current BLM and Wyoming GSG conservation strategies.
2. To reduce the likelihood of a "take" under the Migratory Bird Treaty Act, BLM sensitive species nesting habitat removal will occur outside of the breeding season or be cleared by survey (see EA page 31).
3. Lance will conduct operations to minimize adverse effects to surface and subsurface resources, prevent unnecessary surface disturbance, and conform to currently technology and practice.
4. The selected alternative will help meet the nation's energy needs, and help stimulate local economies by maintaining workforce stability.
5. Lance committed to:
   Comply with the approved APD, applicable laws, regulations, orders, and notices to lessees.
   Obtain necessary permits from agencies.
   Offer water well agreements to the owners of record for permitted wells.
   Incorporate several measures to alleviate resource impacts into their submitted surface use plan and drilling plan.
6. Lance certified it has surface access agreements or posted a 43 CFR 3814.1 bond.
7. The project is clearly lacking wilderness characteristics as the federal surface is less than 5000 acres.
8. These APDs are pursuant to the Mineral Leasing Act for the purpose of exploring or developing oil or gas and do not satisfy the categorical exclusion directive of the Energy Policy Act of 2005, Section 390 because the site-specific analyses covering the project area required updating.

ADMINISTRATIVE REVIEW AND APPEAL. This decision is subject to administrative review according to 43 CFR 3165. 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. Parties 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.

Acting Field Manager: _____ Date: 3/5/13

FINDING OF NO SIGNIFICANT IMPACT
Lance Oil and Gas Company, Inc., Sahara Plan of Development (POD)
Environmental Assessment (EA), WY-070-EA13-72
Bureau of Land Management, Buffalo Field Office, Wyoming

FINDING OF NO SIGNIFICANT IMPACT (FONSI). Based on the information in the EA, WY-070-EA13-72, which BLM incorporates here by reference; I find that: (1) the implementation of Alternative B will not have significant environmental impacts beyond those addressed in the Buffalo Final Environmental Impact Statement (FEIS) 1985, and the Powder River Basin (PRB) FEIS, 2003 (2) Alternative B conforms to the Buffalo Field Office (BFO) Resource Management Plan (RMP) (1985, 2001, 2003, 2011); and (3) Alternative B does not constitute a major federal action having a significant effect on the human environment. Thus an EIS is not required. I base this finding on consideration of the Council on Environmental Quality's (CEQ) criteria for significance (40 CFR 1508.27), with regard to the context and to the intensity of the impacts described in the EA, and Interior Department Order 3310.

CONTEXT: Mineral development is a common PRB land use, sourcing over 42% of the nation's coal. The PRB FEIS foreseeable development analyzed the development of 54,200 wells. The additional development analyzed in Alternative B is insignificant in 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 included in Alternative B will minimize adverse environmental effects. The preferred alternative does not pose a significant risk to public health and safety. The geographic area of project does not contain unique characteristics identified in the 1985 RMP, 2003 PRB FEIS, or other legislative or regulatory processes.

BLM used relevant scientific literature and professional expertise 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. The PRB FEIS predicted and analyzed oil development of the nature proposed with this project and similar projects. The selected alternative does not establish a precedent for future actions with significant effects. The proposal may relate to the PRB Greater Sage-Grouse and its habitat decline having cumulative significant impacts; yet the small size of this project is within the parameters of the impacts in the PRB FEIS. There are no cultural or historical resources present that will be adversely affected by the selected alternative. The project area is clearly lacking in wilderness characteristics as the federal surface is less than 5000 acres. No species listed under the Endangered Species Act or their designated critical habitat will be adversely affected. 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.

ADMINISTRATIVE REVIEW AND APPEAL. This finding is subject to administrative review according to 43 CFR 3165. Request for administrative review of this finding 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 FONSI is received or considered to have been received. Parties adversely affected by the State Director's finding may appeal that finding to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Acting Field Manager: _____ Date: 3/5/13

ENVIRONMENTAL ASSESSMENT (EA), WY-070-EA13-72
Lance Oil and Gas Company, Inc., Sahara Plan of Development (POD)
Buffalo Field Office, Bureau of Land Management, Wyoming

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1. INTRODUCTION

BLM provides an Environmental Assessment (EA) for Lance Oil and Gas Company, Inc. (Lance), Mojave Prospect Area-Sahara Plan of Development (POD) with 21 oil and gas applications for permit to drill (APD) from 12 well pads. Federal jurisdiction for this proposal is from both federal surface over federal mineral lease and fee surface over federal mineral lease (federal lands). This site-specific analysis tiers to and incorporates by reference the information and analysis in the Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project (PRB FEIS), WY-070-02-065, 2003 and the PRB FEIS Record of Decision (ROD) pursuant to 40 CFR 1508.28 and 1502.21. One may review the PRB FEIS and ROD at the BLM Buffalo Field Office (BFO) and on our website: http://www.blm.gov/wy/st/en/field_offices/Buffalo.html.

Congress made a four-part process for federal fluid mineral decisions under the long-term needs of multiple-use. First is the land use/resource management plan (RMP); here it is the PRB FEIS and ROD amendment to the BFO RMP. Second are the decisions of whether and, if so, under what conditions, to lease lands for fluid mineral development. Courts held that leasing decisions are an almost irrevocable resource commitment. Third (this phase) is deciding on the proposed POD or APD, or both: the site-specific analysis and mitigation. Fourth is the monitoring and reclamation of wells and their features.

1.1. Background

Lance submitted the Sahara POD proposal to the BFO to produce oil and natural gas from federally managed fluid mineral bearing formations of the PRB, on federal and fee surface.

- Lance submitted notice of staking (NOS) applications for the proposed wells in the Sahara POD to the BLM on June 12 and 13, and October 22, 2012.
- Lance, BLM BFO resource staff, and other stakeholders conducted a pre-approval onsite meeting for the 12 proposed well pad locations on October 29 and 30, 2012.
- Lance and BLM BFO resource staff met to discuss the project schedule and issues to consider in the EA on November 8, 2012.
- Lance submitted an APD package for the proposed wells to the BLM on December 20, 2012. The APDs included surface access agreement self-certifications, drilling plans, and a surface use plan of operations (SUPO).
- BLM sent a post onsite deficiency letter to Lance on January 10, 2013.
- BLM received Lance's submitted deficiency response January 31, 2013. Further deficiencies were received February 14, 2013.

1.2. Need for the Proposed Project

The need for this project is to determine whether, how, and under what conditions to support the BFO RMP goals, objectives, and management actions (2003 Amendment) with allowing the exercise of the operator's conditional lease rights to develop fluid minerals on federal leases. APD information is an integral part of this EA, which BLM incorporates here by reference (CFR 1502.21). Conditional fluid mineral development supports the RMP and the Mineral Leasing Act of 1920, the Federal Land Policy Management Act (FLPMA), and other laws and regulations.

1.3. Decision to be Made

The BLM will decide whether or not to approve the proposed development, and if so, under what terms and conditions agreeing with the Bureau's multiple use mandate, environmental protection, and RMP.

1.4. Scoping and Issues

BFO publically posted the proposed APDs for 30 days, received no comments, and will timely publish the EA on the BFO website. Previously, BFO conducted extensive external scoping for the PRB FEIS -

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 fluid mineral development the BFO analyzed. External scoping is unlikely to identify new issues, as verified with recent fluid mineral EAs BLM recently externally scoped. External scoping of the horizontal drilling in Samson Resources EA, WY-060-EA11-181, (2011) in the PRB area received 2 comments, revealing no new issues.

The BFO interdisciplinary team (ID team) conducted internal scoping by reviewing the proposed development and project location to identify potentially affected resources and land uses. This EA will not discuss resources and land uses that are either not present, not affected, or that the PRB FEIS adequately addressed. The ID team identified important issues for the affected resources to focus the analysis. This EA addresses the project and its site-specific impacts that were unknown and unavailable for review at the time of the PRB FEIS analysis to help the decision maker come to a reasoned decision. Refer to Appendix A, Affected Resources Worksheet, for a complete list of resources considered by the ID team. The following resources were identified by the ID team for analysis in the EA:

- Air quality
- Cultural resources
- Groundwater
- Invasive species
- Locatable minerals
- Soils and vegetation
- Surface water
- Transportation
- Wetland/riparian
- Wildlife

2. PROPOSED PROJECT AND ALTERNATIVES

2.1. Alternative A – No Action

This no action alternative would deny these APDs and/or POD requiring the operator to resubmit APDs or a POD that complies with statutes and the reasonable measures in the PRB RMP ROD in order to lawfully exercise conditional lease rights. The PRB FEIS considered a no action alternative (pp. 2-54 to 2-62). The BLM keeps the no action alternative current using the aggregated effects analysis approach - incorporating by reference the circumstances and developments approved by the subsequent NEPA analyses for adjacent and intermingled developments to the proposal area; see Section 3, below. This alternative could, through secretarial discretion, suspend the senior leasehold, or could administratively cancel or withdraw the lease if improperly awarded, or seek to cancel the lease. It is not possible in the abstract to identify every interest, and that is beyond the scope here.

2.2. Alternative B – Proposed Action (Proposal)

Overview. Lance's Mojave Prospect Area-Sahara POD proposes to drill and develop 21 horizontal oil and gas wells from 12 pads into federal mineral estate from federal and fee surface overlying federal mineral estate, then horizontally draining fee and/or federal minerals; Table 2.1 and Appendix E-1. The surface owners are: Dry Fork Land and Livestock, Moore Land Company, and BLM. The proposed wells require the construction of engineered (cut and fill) well pads. The total surface disturbance with the construction of the proposed well pads, access roads, and above ground distribution lines will be about 187.7 acres. Interim reclamation of these features will restore about 119.5 acres during the production phase (36.3% of the original surface disturbance remains; about 3.25 acres per well). Access road construction will meet the standards of the anticipated traffic flow and all-weather requirements. Road construction will include ditching, draining, graveling, and crowning of the roadbed. In addition to new access roads, Lance proposes using existing roads to access proposed wells. These existing roads include 14.5 miles that require minimal or no upgrades (no additional disturbance) and 17.9 miles that require minor to moderate upgrades (up to 15 feet of additional interim disturbance). These existing roads typically access multiple well pads, and are not addressed again in the by-well pad tables below; see Sahara POD's Transportation Planning Map in the administrative record (AR). However, the approximately 3 miles of existing roads that will require moderate to major upgrades (up to 30 feet of

additional interim disturbance) serve 1 of 3 pads and are addressed by well pad below. Target zones for the proposed wells include the Frontier, Mowry, Shannon, and Sussex bottom formations at depths of 9,000 to 13,000 feet. See the drilling program with each APD for the targeted zones, legal descriptions, and surface and bottom hole locations. (See also the submitted APDs in the AR, and Table 2.2, below.)

Table 2.1. Well/Pad Name/# Surface Hole, Lateral, and Bottom Hole Leases (SHL/LL/BHL).

#	"Mojave Fed" Well #	"Mojave Fed" Pad #	Twp	Rng	Sec	Qtr	SHL	LL	BHL
1	4277-2-41F-H	4277-11-31	42N	77W	11	NWNE	WYW147342	FEE	WYW160419
2	4277-11-44F-H								WYW146828
3	4277-14-34F-H	4277-14-41	42N	77W	14	NENE	WYW146828		WYW146828
4	4277-22-41F-H	4277-27-31	42N	77W	27	NWNE	WYW146831		WYW152974
5	4277-27-44F-H								WYW147342
6	4277-27-44SH-H								
7	4277-23-31F-H	4277-26-41	42N	77W	26	NENE	WYW128629	FEE	WYW146830
8	4277-26-34F-H							WYW146831	FEE
9	4377-5-11SH-H	4377-5-24	43N	77W	5	SESW	WYW146834		WYW146834
10	4377-8-34SH-H				8	NENW	WYW146836		WYW146836
11	*4377-6-31SH-H	*4377-6-44	43N	77W	6	SESE	WYW146834		FEE
12	*4377-6-31M-H								FEE
13	*4377-7-31SH-H	*4377-7-44	43N	77W	7	SESE	WYW146835		WYW146835
14	4377-9-24SH-H	4377-9-11	43N	77W	9	NWNW	WYW146837		WYW146837
15	4377-17-31SH-H	4377-17-44	43N	77W	17	SESE	WYW146838	FEE	WYW146838
16	4377-20-31SH-H	4377-20-44	43N	77W	20	SESE	WYW146840		FEE
17	4377-21-21SH-H	4377-28-31	43N	77W	28	NWNE	WYW146843		WYW146841
18	4377-21-21SX-H								
19	4377-28-44SH-H								WYW146843
20	4377-27-11SH-H	4377-27-34	43N	77W	27	SWSE	WYW146842	FEE, WYW50143	WYW146842
21	4377-34-44SH-H								WYW146845

*Three wells on 2 pads are on BLM surface. All others are on fee surface.

The 21 proposed wells are on 12 well pads, 7 will accommodate multiple wells.

Rights-of-Way. Lance identified the following 50-foot-wide and well pad site right-of-way (ROW) as part of the proposal. BLM will consider granting federal ROW for the following locations (see the Transportation Planning Map submitted with Lance's APD package):

- An improved template road proposed for access to pad Mojave Fed 4377-6-44 (shared by Mojave Fed 4377-6-31SH-H and Mojave Fed 4377-6-31M-H) (1,730 feet).
- An existing road crossing BLM surface for access to Mojave Fed 4377-5-11SH-H and Mojave Fed 4377-8-34SH-H (shared pad), Mojave Fed 4377-6-31SH-H and Mojave Fed 4377-6-31M-H (shared pad), Mojave Fed 4377-7-31SH-H, and Mojave Fed 4377-9-24SH-H (2,789 feet).
- A well pad that crosses lease boundaries on BLM surface for the Mojave Fed 4277-11-31 pad.

ROW Grant	ROW Action	Section	Twp	Rng	Lengths	Width
WYW-168397	Road	7, 8, 17	43N	77W	4,370'	NTE 50'
WYW-168402	Well Pad	2	42N	77W	2.060 acres	
Lengths and width in feet. NTE: not to exceed.					Acres of Disturbance 7.08 acres	

The proposal involves the following proposed surface disturbances:

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4277-11-31 constructed pad/tank battery	800’	550’	11.6	4.5
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.9	
Access Road	1,045’	50’	1.2	0.6
Above Ground Distribution Lines (preliminary estimate)	1,200’	30’	0.8	0.2
Total Disturbance for this location			**15.6**	

NOTE: In addition to existing access roads that require minimal upgrades, access to this well pad requires about 8,107 feet of moderate to major upgrades to existing roads, re-routing an existing road with 950 feet of new engineered road, and constructing of 95 feet of new template road. Initial road disturbance will be lower where proposed road reconstruction occurs in areas of existing disturbance (see Lance’s Transportation Planning Map).

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4277-14-41 constructed pad/tank battery	825’	448’	10.1	4.0
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.7	
Access Road	1,595’	50’	1.8	1.0
Above Ground Distribution Lines (preliminary estimate)	3,200’	30’	2.2	0.7
Total Disturbance for this location			**15.8**	

NOTE: Access to this well pad requires no to moderate upgrades to existing roads, re-routing 1,040 feet of an existing road with new template road, and constructing 5551 feet of new template road. Initial road disturbance will be lower where proposed road reconstruction occurs in areas of existing disturbance (see Lance’s Transportation Planning Map).

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4277-26-41 constructed pad/tank battery	800’	550’	11.1	4.5
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.8	
Access Road	2,940’	varies	3.2	1.7
Above Ground Distribution Lines (preliminary estimate)	0’	N/A	0.0	0.0
Total Disturbance for this location			**16.1**	

NOTE: Access to this well pad requires minor to moderate upgrades to existing roads, constructing 2,750 feet of new template road, and 190 feet of re-routed primitive road.

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4277-27-31 constructed pad/tank battery	870’	555’	11.3	4.8
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.9	
Access Road	2,395’	varies	1.6	1.0
Above Ground Distribution Lines (preliminary estimate)	2,100’	30’	1.4	0.4
Total Disturbance for this location			**16.2**	

NOTE: Access to this well pad requires minor to moderate upgrades to existing roads, re-routing 1,310 feet of an existing primitive road for coalbed natural gas (CBNG) well access, and constructing 1,085 feet of new template road.

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4377-17-44 constructed pad/tank battery	800’	485’	9.4	4.2
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.7	
Access Road	550’	50’	0.6	0.3
Above Ground Distribution Lines (preliminary estimate)	4,000’	30’	2.8	0.8
Total Disturbance for this location			**14.4**	

NOTE: Access to this well pad requires minimal to moderate upgrades to existing roads and the construction of 550 feet of new template road.

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4377-20-44 constructed pad/tank battery	700’	540’	10.2	4.2
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.6	
Access Road	100’	50’	0.1	0.1
Above Ground Distribution Lines (preliminary estimate)	1,200’	30’	0.8	0.2
Total Disturbance for this location			**12.8**	

NOTE: Primary and secondary access routes to this well pad require minimal to moderate upgrades to existing roads and the construction of 100 feet of new template road.

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4377-27-34 constructed pad/tank battery	851’	500’	11.0	3.6
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.9	
Access Road	3,620’	50’	3.9	2.1
Above Ground Distribution Lines (preliminary estimate)	3,400’	30’	2.3	0.7
Total Disturbance for this location			**20.5**	

NOTE: In addition to existing access roads that require no to moderate upgrades, access to this well pad requires approximately 6,590 feet of moderate to major upgrades to existing roads, re-routing an existing road with 2,310 feet of new engineered road, and constructing of 1,130 feet of new engineered road. Initial road disturbance may be lower where proposed road reconstruction occurs in areas of existing disturbance (see Lance’s Transportation Planning Map).

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4377-28-31 constructed pad/tank battery	750’	575’	11.5	4.6
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.9	
Access Road	1,080’	50’	1.2	0.6
Above Ground Distribution Lines (preliminary estimate)	1,800	30’	1.2	0.4
Total Disturbance for this location			15.9	

NOTE: Access to this well pad requires minimal to moderate upgrades to existing roads and the construction of 1,080 feet of new template road.

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4377-5-24 constructed pad/tank battery	750’	600’	10.7	4.8
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.8	
Access Road	1,065’	varies	0.9	0.5
Above Ground Distribution Lines (preliminary estimate)	600’	30’	0.4	0.1
Total Disturbance for this location			13.7	

NOTE: In addition to existing access roads that require minimal to moderate upgrades, access to this well pad requires re-routing 400 feet of an existing primitive road for CBNG well access and constructing of 665 feet of new template road.

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4377-6-44 constructed pad/tank battery	750’	550’	10.7	4.9
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.9	
Access Road	2,780’	varies	3.0	1.7
Above Ground Distribution Lines (preliminary estimate)	700’	30’	0.5	0.1
Total Disturbance for this location			16.0	

NOTE: Approximately 1,050 feet of the proposed template road is on fee surface, with the remainder on BLM surface. Disturbance calculation assumes 44-foot width on BLM and 50-foot width on fee surface. Inclusive of disturbance for new federal road ROW application to access the well pad.

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4377-7-44 constructed pad/tank battery	800’	525’	10.3	3.5
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.8	
Access Road	1,020’	44’	1.0	0.6
Above Ground Distribution Lines (preliminary estimate)	400’	30’	0.3	0.1
Total Disturbance for this location			13.3	

NOTE: In addition to existing access roads that require minimal to moderate upgrades, access to this well pad requires approximately 1,372 feet of moderate to major upgrades to existing roads and constructing 1,020 feet of new template road on BLM surface (44-foot initial width).

Activity	Length (feet)	Width (feet)	Acres of Disturbance	Interim Disturbance
Mojave Fed 4377-9-11 constructed pad/tank battery	750’	550’	10.7	4.5
Cut/fills & Topsoil/spoil stockpiles	varies	varies	1.8	
Access Road	545’	50’	0.6	0.3
Above Ground Distribution Lines (preliminary estimate)	5,200’	30’	3.6	1.1
Total Disturbance for this location			16.7	

NOTE: Access to this well pad requires minimal to moderate upgrades to existing roads and the construction of 545 feet of new template road.

Table 2.2. Anticipated Drilling and Completion Sequence and Timing (per well).

Drilling and Completion Step	Approximate Duration
Build Location (roads, pad, and other initial infrastructure)	30 days
Mob Rig	2-4 days [1]
Drilling (24/7)	30 days [2]
Schedule/logistics	30 days
Completion (setup, completion, demobilization)	5-8 days

[1] Depending on distance and needed to add supplemental drilling equipment, such as skidding plates.
[2] By comparison, approximately 2 days are required to drill a CBNG well.

Drilling, Construction, and Production Design Features Include:

- Drilling 18 wells on private surface over federal minerals on 10 well pads (initial disturbance: 125.4 acres; interim disturbance: 43.8). (see Sahara POD SUPO p.1)
- Drilling 3 wells on BLM-administered federal surface over federal minerals on 2 well pads (initial disturbance: 24.6 acres; interim disturbance: 8.4 acres). (see Sahara POD SUPO p.1)
- Well pads and associated infrastructure locations were selected to avoid areas with major soil limitations, including slopes in excess of 25%, high wind and water erosion potential, and low reclamation potential (LRP).
- Lance anticipates completing drilling and construction in 2 years. Drilling and construction is year-round in the PRB. Weather may cause delays rarely lasting multiple weeks. Timing limitations via COAs and/or agreements with landowners may impose longer temporal restrictions.
- A network of existing improved roads to access the project area. State Highways 192 and 387 serve as the primary access routes to the project area; average daily traffic estimates along these routes for 2010 were 188 and 1,084 vehicles, respectively (WYDOT 2012). Improved engineered roads, improved template roads, and primitive roads will be constructed to access individual well pads (3.5 miles; initial disturbance: 19.3 acres; interim disturbance: 10.5 acres). Existing template and primitive roads will be re-routed at 4 well pads to maintain CBNG well access, but will not be used by drill rigs. All new and reconstructed roads will be fully built to finished parameters before drill rigs are onsite. Segments of existing roads may be widened by 15 to 30 feet based on existing road type and condition. (see Sahara POD SUPO pp.5-6)

- Lance anticipates average daily trips per well for a typical well would be: pre-construction phase: 19; drilling phase: 44; completion phase: 160; production and operation phase: 4.
- An existing above ground electric distribution line network with the installation of new above ground lines (installed by third-party utility companies) to deliver power to the proposed well pads. Approximately 4.9 miles of additional overhead distribution lines will be needed to serve the proposed wells. Initial and post-interim reclamation surface disturbance estimates for the proposed distribution lines are 17.8 and 5.3 acres, respectively. If the distribution line is incomplete before the wells are in production, Lance may use diesel electric generators to provide temporary power. Operation of each generator would require a fuel storage tank of up to 1,000-gallon capacity on location. Lance anticipates fuel deliveries up to 3 times per week. (see Sahara POD SUPO pp. 4-5)
- A closed loop fluid handling system with drill cuttings tested and handled according to approved methods. Lance company policy prohibits free-standing liquids, which is enforced by quarterly Spill Prevention, Control, and Countermeasure (SPCC) inspections. Cuttings disposal, burial, and/or use will be approved via sundry with BLM. (see Sahara POD SUPO p. 8)
- Exclosure fencing will be placed around open pits for personnel, wildlife, and livestock safety. All open-top pits, tanks, and pipes containing hydrocarbons will be netted, screened, or equipped with avian exclusion devices to prevent injury or death to migratory birds, livestock, and wildlife. Lance will install fence markers on all wire fences constructed within 1.25 miles of Greater Sage-Grouse leks to reduce the chances of collision. (see Sahara POD SUPO p. 11)
- Potential production facilities include a pumping unit, up to 7 400-barrel (bbl) tanks per well (oil and water), a horizontal or vertical heater treater (6 feet by 20 feet), a vertical two-phase inlet separator (30 inches by 10 feet), a vertical outlet separator (30 inches by 6 feet), an electric or gas-driven recycle pump, an emissions control device, if needed (size varies), and a flare stack to temporarily burn produced gas. Changes to production facilities would be subject to a sundry notice. (see Sahara POD SUPO, pp. 3-4)
- Water needed for drilling and completion will be sourced from 2 existing water loadouts (Mojave #1 and Meike; see the Mojave Area Water Loadout Map included in the APD package for loadout locations). Both water loadouts tap into existing coal bed natural gas (CBNG) water pipelines. Trucks, using about 700 round trips, will haul the water and Lance will store it in large tanks on location. If production warrants, Lance will consider the use of above-ground pipelines to transport water from the loadouts to the well locations, following existing road or pipeline ROWs when practicable. For each well, Lance will use approximately 10,000 bbls of water for drilling and 90,000 additional bbls of water for completions. (see Sahara POD SUPO pp. 6-7)
- Lance anticipates that the proposed wells will produce minimal gas volumes; yet, if commercial gas volumes are present, gas gathering lines could be proposed. If a well was completed as a gas producer, a buried gas gathering pipeline would be installed to transport natural gas from the well to a gas gathering trunkline and on to an off-lease central compression facility. (see Sahara POD SUPO p. 5)
- All waste and hazardous materials, including hazardous waste, drilling waste, sewage, solid waste, and motor oil, will be stored and handled using approved disposal methods, as detailed in the Sahara POD SUPO. (see Sahara POD SUPO pp.8-9)
- If the wells are put in production, produced water will be stored in tanks on the location and trucked to a Wyoming Department of Environmental Quality (WDEQ) Class II approved or other approved disposal facility. Specifics related to production will be addressed by sundry action. Potential quantities of produced water are unknown at this time. (see Sahara POD SUPO p. 5)

For a detailed description of design features and construction practices associated with the proposed project, refer to the SUPO and drilling plans included with the APDs. Also see the subject APDs for maps showing the proposed well locations and associated facilities described above. BLM incorporated and analyzed the implementation of committed mitigation measures in the SUPO and drilling plan, in addition to the COAs in the PRB FEIS ROD, as well as changes made at the site.

Reasonably Foreseeable Development. *Water Supply:* In addition, Lance may develop 2 new water loadout facilities (Mojave #3 and Mojave #4, Table 2.3, below) that would be tied-in to existing infrastructure with an approximately 9-mile underground water supply pipeline and 0.7 miles of above ground distribution lines. In addition, a new 2.2-mile road may be constructed to shorten the distance between the Meike Water Loadout and multiple wells in the Mojave area. Each loadout would consist of an approximately 5-acre graveled surface that would provide access to a loadout station and equipment trailer. These potential drilling and completion water sources are not water sources for the proposal. Should Lance wish to use these water loadouts to support activities associated with the proposed action in the future, a sundry notice would be required. The Mojave Area Water Loadout Facilities map included with the APD package for the proposed wells depicts the locations of the potential future water loadouts.

Table 2.3. Location of Potential Future Water Loadouts.

Water Loadout	Status	Landowner	Acres	Legal Location of Water Well			
				Quarter	***Section***	***Township***	***Range***
Mojave #3	future	Barbara Ogle	4.7	NESW	10	42N	77W
				SESW	10		
Mojave #4	future	Dry Fork Land & Livestock, LP	5.0	SESW	33		

Adjacent Developments: If the development of the proposal is successful, it is likely that Lance and other companies will pursue development of oil and gas from leases adjacent to the project area. Though the project location is different, the geographic and resource conditions for this area of reasonably foreseeable development are sufficiently similar to the proposed action area of analysis analyzed in this EA. Information provided by Lance identifies 36 authorized federal oil and gas leases totaling 21,203 acres in adjacent areas. Lance has at least a partial interest in 14 of these 36 federal leases (totaling 7,546 acres). The reasonably foreseeable development for this and adjacent areas includes oil/gas exploration using existing CBNG or access roads and infrastructure put in place for fee and/or federal mineral development. Such development would be essentially similar to the proposed action discussed in this document. BLM will evaluate future development and resource parameters in light of its multiple use mandate - highlighting similarities and distinction between any proposals, this EA, other EAs, and the RMP.

2.3. Conformance with the Land Use Plan and Other Environmental Assessments

This proposal does not diverge from the goals and objectives in the BFO RMP (1985, 2001, 2003, and 2011), and generally conforms to the terms and conditions of that land use plan, its amendments, and supporting FEISs (1985, 2003).

3. AFFECTED ENVIRONMENT

This section briefly describes the physical and regulatory environment affected by the alternatives in Section 2. Aspects of the affected environment focus on the major issues. A screening of all resources and land uses potentially affected is in Appendix A. Resources unaffected, or not affected beyond the level analyzed in the PRB FEIS, are outside this EA's scope**.** The Wyoming Game and Fish Department's (WGFD's) Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats (2009) make no distinction between surface disturbance impacts per well type or drilling technology. BLM's position is there is a rare lack of distinction in surface disturbance impacts attributable to well type, subject to showing a distinction, not a mere difference, and this tracks to surface disturbance issues as with soils, vegetation, invasive species, wetlands, cultural resources, etc. (See State Director Reviews, WY-2010-023, Part 2, p. 3, fn. 7 and WY-2013-005, pp. 2-4.) This supports national policy where no distinction exists in 43 CFR 3160 et. seq, leasing, Form 3160-3, and 2005's Energy Policy Act.

Project Area Description

The project area is on sparse dry herbaceous rangeland and sagebrush east of the Powder River. Elevations are 4,500 to 5,200 feet above sea level. The project area is in the PRB, a Level IV ecoregion classified as a western mixed-grass/short-grass prairie. The climate is semi-arid with a mean annual precipitation of 13 to 14 inches (University of Wyoming 2012). The topography is gently rolling terrain bisected by small ephemeral and intermittent drainages. Livestock grazing is the primary land use, with secondary uses for oil and gas development and production, wildlife habitat, and big game hunting. Project area surface ownership is a patchwork of fee (83.5%), federal land administered by the BLM (12.9%), and state-owned lands (3.5%). Federal mineral interest covers 16,586 acres (92.8%) of the area, and consists of 2,716 acres (15.2%) of coal estate and 13,870.4 acres (77.6%) for all minerals.

The BLM permitted 3 CBNG PODs within and adjacent to this proposal: Bullwhacker II POD EA (WY-070-04-333, 2004), Bullwhacker III POD EA (WY-070-05-198, 2005), and East Bullwhacker POD EA (WY-070-06-137, 2006). The total number of conventional wells approved by the BFO as of March 2012 was 359, which includes 193 horizontal wells. The Wyoming Oil and Gas Conservation Commission (WOGCC) permitted 103 additional wells on fee lands within the BFO. The total is 463, which represents approximately 15% of the 3,200 natural gas and oil wells projected for development in the BFO and Thunder Basin National Grassland by the 2003 PRB ROD. Thus, the existing and foreseeable development of conventional oil and gas wells in the project area is well within the parameters analyzed in the PRB FEIS and ROD. There are approximately 208 permitted and producing oil and gas wells in the overall project area (205 CBNG wells and 3 oil wells), excluding permits associated with leases being developed under the proposed action (WOGCC 2012). The total estimated surface disturbance for these existing and permitted wells is 130.4 acres, based on assumptions and analyses in the draft Crazy Cat East EA (WY-070-EA13-028) the Table Mountain Phase 4 CBNG POD EA (BLM 2010b), and the PRB FEIS (pp. 2-31 and 4-312) for horizontal, CBNG, and vertical well pads, respectively. Other existing surface disturbances in the project area consist of improved and primitive roads (125.8 acres), compressor stations (6.3 acres), and overhead distribution lines.

Table 3.1. Adjacent or Overlapping NEPA Analyses BLM Incorporates by Reference

POD Name	NEPA Document	Well Pads: Number/Long-term Disturbance (acres)	Roads: Length (miles) Long-term Disturbance (acres)	Total Long-term Disturbance (acres)[1]	Decision
East Bullwhacker	WY-070-06-137	55/5.5	18.3/98.4	461.9	8/15/06
Bullwhacker III	WY-070-05-198	116/11.6	50.5/6.1	22.3	5/13/05
Bullwhacker II	WY-070-04-333	117/11.7	54.8/213.0	665.5	9/30/04
Durham Ranches[2]	WY-070-EA13-83	4 wells on 3 pads/8.3	0.5/3.1	12.7	2/21/13
Crown Prospect[2]	WY-070-EA13-25	1/2.3	1.5/7.3	12.5	12/28/12

[1] Summary disturbance tables for each EA provide long-term disturbance estimates for all POD infrastructure.
2 Projects use substantially similar horizontal drilling technology, are on the east side of the Powder River watershed in substantially similar short grass sage brush monoculture – as is the case with this Sahara POD proposal.

3.1. Air Quality

WDEQ has primacy for maintaining Wyoming's air quality with oversight by the U.S. Environmental Protection Agency (EPA) per the Clean Air Act, 42 USC 7401-7671q (2006). No site-specific air quality data are available from the immediate project area; however, air quality in the PRB is generally good, with existing air quality listed as "unclassified/attainment" for all ambient air quality standards. The PRB area is characterized by limited industrial or residential air pollution emissions sources and good atmospheric dispersion of air pollutants due to the frequently windy conditions (BLM 2005). Refer to the PRB FEIS, pp. 3-291 to 3-299, for a 2003-era description of the air quality conditions. BLM also incorporates by reference the Update of Task 3A Report for the Powder River Basin Coal Review Cumulative Air Quality Effects for 2020 (BLM 2009a), as it captures the cumulative air quality effects of

present and projected PRB fluid and solid mineral development. Despite current attainment with federal and state standards, air quality is a rising concern in the PRB, especially in light of the EPA's determination of the oil and gas producing Upper Green River Basin in southwest Wyoming as one of the nation's 40 "nonattainment" zones for ozone in 2012. The EPA established ozone standards in 2008, finalizing them in 2011. In addition, air quality alerts were issued in 2011 in the PRB for particulate matter (PM) attributed to coal dust. Air quality within the PRB is also evaluated under the Prevention of Significant Deterioration (PSD) program. The northeast Wyoming visibility study is ongoing by the Wyoming Department of Environmental Quality.

Four sites monitor the air quality in the PRB: Cloud Peak in the Bighorn Mountains, Thunder Basin northeast of Gillette, Campbell County south of Gillette, and Gillette. In addition, the Wyoming Air Resource Monitoring System (WARMS) measures meteorological parameters from six sites, and particulate concentrations from five of those sites, speciated aerosol (three locations), and evapotranspiration rates (three locations). These sites are at Sheridan, Taylor Reservoir, South Coal Reservoir, Buffalo, Juniper, and Newcastle. One additional WARMS site is planned for construction in the Fort Creek area. Air quality monitoring sites adjacent to the Wyoming PRB-area are at Birney on the Tongue River 24 miles north of the Wyoming-Montana border, Broadus on the Powder River in Montana, and Devils Tower.

Existing air pollutant emission sources in the region include:

- Exhaust emissions (primarily carbon monoxide [CO] and nitrogen oxides [NO_X]) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions;
- Particulate matter [PM] (dust) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas, road sanding during the winter months, and coal mines and trains;
- Transport of air pollutants from emission sources located outside the region;
- Urban corridor emissions;
- NO_X, PM, and other emissions from diesel trains; and
- Sulfur dioxide [SO_2] and NO_X from power plants.

The air quality analysis in the draft Crazy Cat East EA (WY-070-EA13-028), which estimated per well criteria pollutant emissions for typical conventional oil and gas and CBNG wells in the PRB during pad construction, drilling/completion, and production phases, is incorporated here. Emissions estimates for existing wells in the project area based on this analysis are shown in Table 3.2.

Table 3.2. Emissions Estimates for Existing Wells in the Project Area

Development Type[1]	Emissions (tons per year)				
	NO_x	***PM_{10}***	***SO_2***	***CO***	***VOC***
Conventional Oil and Gas Wells (3 wells)[2]					
Production and Operations[3]	0.084 (0.028 per well)	0.069 (0.023 per well)	0.006 (0.002 per well)	0.019 (0.006 per well)	0.007 (0.002 per well)
CBNG Wells (205 wells)[2]					
Production and Operations[3]	56.771 (0.277 per well)	5.205 (0.025 per well)	0.195 (0.001 per well)	68.756 (0.335 per well)	31.632 (0.154 per well)

Note: Total emissions may not correspond exactly to per-well emissions factors due to number rounding.
Source for emissions factors: Supplemental Air Quality Analysis to the Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans (BLM 2007); Appendix A: Emissions Input, pp. A-39 and A-61.
[1] WOGCC identifies 208 permitted and producing oil/gas wells (205 CBNG and 3 oil wells) in the project area, excluding expired permits and permits associated with leases being developed under this proposal. (WOGCC 2012).
[2] Per-well emissions factors for conventional oil and gas wells, based on the emissions inventory conducted as part of the Air Quality Technical Support Document (Argonne National Laboratory 2002), do not include emissions for operational activities associated with compressors, dehydrators, or compressor station visits because the inventory assumed that compressor and dehydrator installation would coincide with CBNG operations and the small amount of conventional gas would be mingled with CBNG, so no additional compression or dehydration would be required. These assumptions could understate the emissions from conventional oil and gas wells in the project area, and could result in greater emissions estimates for CBNG wells than might be typical for wells of this type.
[3] Existing wells are assumed to be in production and operations.

3.2. Soils and Vegetation

BLM obtained detailed soils identification and data for the project area from the South Johnson County Survey Area, Wyoming Soil Survey Geographic (SSURGO) Database (WY619). The soil survey was performed by the Natural Resource Conservation Service (NRCS) according to National Cooperative Soil Survey standards. The BLM uses county soil survey information to predict soil behavior, limitations, or suitability for a given activity or action. Many of the area soils and landforms present distinct challenges for development and/or eventual site reclamation. NRCS data was field verified at proposed well pads and access roads on July 3, 2012. The Sahara POD Reclamation Plan/Site Reports report the findings of these field surveys. NRCS soil series and ecological sites did not necessarily match those identified onsite. Soils in the project area differ with topographic location, slope, and elevation. Topsoil depths to be salvaged for reclamation from road and well pad construction range from 0 to 6 or more inches, with most between 2 and 6 inches. Erosion potential varies depending on the soil type, vegetative cover, and slope. Soils reclamation varies. The main soil limitations at proposed construction sites include coarse fragments, calcium carbonate ($CaCO_3$), shallow depth to bedrock, moderate erosion potential, or none.

Soils 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 resulting in a wide variety of surface and subsurface textures. Soil depths vary from deep on lesser slopes to shallow and very shallow on steeper slopes. Differences in lithology produced topographic and geomorphic variations. Ridges and hills are often protected by an erosion resistant cap of clinker, terrace gravels, or sandstone. Parent material chemistry may result in local concentration of salts. Table 3.3 is a summary of the dominant soil map units in the project area.

Table 3.3. Dominant Soils in the Project Area by Map Unit Symbol (MUS)

MUS	Map Unit Name	Acres in Project Area	Percent of Project Area
RAD	Razor-Gaynor-Samsil complex, hilly	3,406.7	19.1
RED	Renohill-Razor association, rolling	3,240.0	18.1
SNd	Shingle-Kim association, valleys	2,008.8	11.2
Total		**8,655.6**	**48.4**

Source: NRCS 2012

The Sahara POD Reclamation Plan/Site Reports Soil map identified the following map units at proposed well pads and access roads: Maysdorf-Garrett association; Kim-Zigweid association, gently rolling; Limon-Gaynor association; Maysdorf-Schooner association; Renohill-Razor association, rolling; Renohill-Razor, rolling; Briggsdale-Pugsley association; Cushman-Briggsdale association; and Razor-Gaynor-Samil complex, hilly. Refer to the Sahara POD Reclamation Plan for details. A BHEC (2012) survey identified sagebrush (*Artemisia spp.*) scattered throughout the project area. Short native grasses, including blue grama (*Bouteloua gracilis*), western wheatgrass (*Agropyron smithii*), needle-and-thread (*Stipa comata*), and prairie junegrass (*Koeleria macrantha*) are common, along with cheatgrass (*Bromus tectorum*). Cottonwood trees (*Populus spp.*) exist in several drainages. The dominant vegetation community is short-grass prairie, which encompasses 80.6% of the project area (Table 3.4). Dominant vegetation communities in the Sahara POD Reclamation Plan/Site Reports include big sagebrush scrubland, silver sagebrush shrubland, breaks shrubland, upland grassland, and previously reclaimed areas. These sites support vegetation species identified in the broader project area, as well as Sandberg bluegrass (*Poa secunda*), threadleaf sedge (*Carex filifolia*), broom snakeweed (*Gutierrezia sarothrae*), green needlegrass (*Nassella viridula*), and Indian ricegrass (*Achnatherum hymenoides*). The PRB FEIS, pp. 3-92 to 3-103, has detailed discussion on short-grass prairie and sagebrush shrubland habitats.

Table 3.4. Dominant Vegetation Cover Types in the Project Area

Vegetation Cover Type	Acres in Project Area	Percent of Project Area
Short-grass prairie	14,395.3	80.6
Sagebrush shrubland	3,273.9	18.3
Total	**17,669.3**	**98.9**

Source: BLM 1996 based on WGFD land cover classifications mapping data (BLM 1996).

Ecological site descriptions provide soils and vegetation information needed for resource identification, management, and reclamation recommendations. Using the NRCS (NRCS, USDA) Technical Guides for the Major Land Resource Area 58B Northern Rolling High Plains, the project area primarily consists of 3 ecological sites in the 10 to 14 inch Northern Plains precipitation zone, verified through onsite field reconnaissance (see Table 3.5, below). Project area dominant ecological sites are Clayey (39.5%), Loamy (36.7%), and Shallow Loamy (16.8%) sites in the 10 to 14 inch Northern Precipitation Zone. The Sahara POD Reclamation Plan/Site Reports identified Clayey and Loamy ecological sites at all proposed well pad and access road locations. Refer to ecological site narrative sections below for a description of vegetation species observed during onsite field visits. See the NRCS Soil Survey Johnson County (SSURGO) data. The Ecological Site interpretations include additional site-specific soil information.

Table 3.5. Dominant Ecological Sites in the Project Area

Ecological Site[1]	Acres in Project Area	Percent of Project Area
Clayey (Cy)	7,067.3	39.5
Loamy (Ly)	6,565.1	36.7
Shallow Loamy (SwLy)	2,999.9	16.8
Total	**16,632.3**	**93.1**

Source: NRCS 2012

[1] Ecological site descriptions listed are in the 10 to 14 inch Northern Plains Precipitation Zone.

A description of dominate ecological sites and plant communities identified in the project area follows:
Clayey Site description and plant community. Clayey Sites occur on nearly level to steep slopes on landforms which include hill sides, alluvial fans, and stream terraces in the 10 to 14 inch precipitation zone. The soils of this site are moderately deep to very deep (greater than 20 inches to bedrock), well-drained soils that formed in alluvium or alluvium over residuum. These soils have slow permeability. The bedrock is clay shale which is virtually impenetrable to plant roots. The present plant community is a mixed sagebrush/grass. Wyoming big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs.

Loamy/Shallow Loamy Site description and plant community. This site occurs on steep slopes and ridge tops, but may occur on all slopes. The soils of this site are shallow (less than 20 inches to bedrock) well-drained soils formed in alluvium over residuum or residuum. These soils have moderate permeability and may occur on all slopes. The bedrock may be any kind, which is virtually impenetrable to plant roots, except igneous. The surface soil will have one or more of the following textures: very fine sandy loam, loam, silt loam, sandy clay loam, silty clay loam, and clay loam. Thin, ineffectual layers of other textures are disregarded. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. The main soil limitations include the depth to lithologic discontinuity and fragmental (90% coarse fragments). The present plant community is a mixed sagebrush/grass. Wyoming big sagebrush is a significant component of this mixed sagebrush/grass plant community. Cool-season mid-grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs.

3.3. Water Resources

WDEQ has primacy for maintaining Wyoming's water quality with oversight by the EPA per the Clean Water Act, 33 USC 1251 et seq. (1972). The Wyoming State Engineer's Office (WSEO) regulates water rights and permitting impoundments for the containment of the State's surface waters. The WOGCC has authority for permitting and bonding off-channel pits located over state and fee minerals.

3.3.1. Groundwater

WSEO data identifies 16 permitted water wells within 1 mile of the proposed wells, excluding wells designated exclusively for CBNG use. These wells include 2 designated exclusively for stock, 10 wells for CBNG and stock use, and 4 wells for CBNG and miscellaneous use (WSEO 2012).[1] These wells are from 560 and 1,945 feet deep. No domestic water wells were identified within 1 mile of the proposed wells. Refer to the PRB FEIS for additional information on groundwater (pp. 3-1 to 3-36). The 2004 EPA study found it unlikely that hydraulically fractured CBNG wells would contaminate ground water. Studies from the University of Texas and Massachusetts Institute of Technology echo decades of industry and regulatory experience that good casing, cement plans, and execution are keys to protect groundwater from hydrocarbon communication. Induced minor seismic activity at the low volumes used in the PRB is remotely likely to rise to a substantial environmental question of material significance so BLM does not further address it, (WY SDR-2013-005, pp. 12-13; EPA 2011; Frohlich el al. 2010, BLM 2009b).

3.3.2. Surface Water

The project area lies entirely in the Upper Powder River watershed (Hydrologic Unit Code [HUC] 8-digit code: 10090202). 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, Glossary). The channels are primarily

[1] *Approximately 5% of water right records did not have coordinate data when downloaded from WSEO database. Thus, some wells may not be included in this analysis.*

well vegetated grassy swales, without defined bed and bank. No natural springs were identified within 1 mile of the proposed wells. See the PRB FEIS' water surface and quality discussion, pp. 3-36 to 3-56.

3.4. Locatable Minerals

The project area is over and amidst uranium mineral leases that are actively being developed. The Fort Union Formation and the Wasatch Formation are the most important uranium-bearing formations in the PRB. These formations are at depths of less than 800 feet, while the depth of the formations for Lance's proposed wells range from 9,000 to 13,000 feet. Uranium recovery has surface disturbance for construction of roads, facilities, and well locations. These activities are similar to those required for oil and gas projects, including construction of surface facilities, access roads, well fields, utilities, and pipelines, as well as top soil removal, land grading, and interim reclamation.

3.5. Wetlands/Riparian

Approximately 6,127.4 acres (34.3%) of the project area are within 500 feet of riparian areas. There are 15.6 acres (8.7%) of National Wetland Inventory (NWI)-designated wetlands in the project area, which include freshwater emergent wetlands, freshwater ponds, and other wetland types (FWS 2012), none of which would be disturbed by the proposed development; therefore, no further analysis of effects to wetlands is included in this EA.

3.6. Invasive / Noxious Species

Invasive/noxious weeds occurring in the project area (Table 3.6) were identified by the Johnson County Weed and Pest Board (Litzel pers. comm.). Scotch thistle (*Onopordum acanthium*) was the primary noxious weed occurring in the project area (Litzel pers. comm.). Although neither the State of Wyoming nor Johnson County identify cheatgrass (*Bromus tectorum*) and Japanese brome (*B. japonicus*) as noxious weeds, these species can be highly invasive on a variety of sites and were identified in the project area during surveys by BHEC (2012) and by the BLM during the Sahara POD project on-sites.

Table 3.6. Invasive / Noxious Weeds Potentially Occurring in the Project Area

Common Name	Scientific Name	Status[1]	Present in Project Area[2]
Black henbane[3]	*Hyoscyamus niger* L.	Declared (County)	Yes
Buffalo bur	*Solanum rostratum* Dunal	Declared (County)	Yes
Canada thistle	*Cirsium arvense* L.	Designated (State)	Yes
Common cocklebur	*Xanthium strumarium* L.	Declared (County)	Yes
Common mullein	*Verbascum thapsus* L.	Declared (County)	Likely
Dalmatian toadflax	*Linaria dalmatica* (L.) Mill.	Designated (State)	Yes
Saltcedar	*Tamarix spp.*	Designated (State)	Yes
Scotch thistle	*Onopordum acanthium* L.	Designated (State)	Yes
Wild licorice	*Glycyrrhiza lepidota* Pursh	Declared (County)	Yes

[1] Wyoming Weed and Pest Council maintains declared and designated weed lists (WDA 2012a; WDA 2012b).
[2] Personal communications with the Johnson County Weed and Pest Board (Litzel pers. comm.).
[3] Black henbane (*Hyoscyamus niger*) is not listed as a declared weed in Johnson County, but is a declared weed in neighboring counties and exists in the project area.

3.7. Fish and Wildlife

The PRB FEIS identified wildlife species occurring in the PRB on pp. 3-113 to 3-206. The subsections below provide more information on select species with potential to occur in or near the project area based on the findings of the *Sahara Plan of Development Wildlife Survey and Habitat Report* (BHEC 2012) and observations from the BLM during the project on-site on October 29 and 30, 2012. BLM evaluated impacts to wildlife resources and recommended project modifications where wildlife issues arose. BLM wildlife biologists also consulted databases compiled and managed by BLM BFO wildlife staff, the PRB FEIS, WGFD datasets, and the Wyoming Natural Diversity Database (WYNDD) to evaluate the affected

environment for wildlife species that may occur in the area. This section describes the affected environment and impacts to wildlife known or likely to occur in the area of the proposed project.

3.7.1. Big Game

The PRB FEIS discussed the affected environment for pronghorn antelope (*Antelocapra americana*) and mule deer (*Odocoileus hemionus*) on pp. 3-117 to 3-122 and pp. 3-127 to 3-132, respectively. Pronghorn and mule deer sign were identified at the proposed well pads by a BLM biologist during the project on-site. No crucial winter range, parturition areas, or migration routes for these big game species overlap the project area (WGFD 2012); however, year-long and winter/yearlong range for pronghorn and mule deer are present throughout most of the project area (Table 3.7) (WGFD 2012). Range designated by the WGFD as winter/yearlong is used by a population or portion of the population on a year-round basis, with significant influx of additional animals into the area from other seasonal ranges during the winter months (between December 1 and April 30). Transient white-tailed deer or elk may occur in the area. The project area is overlapped by WGFD-designated herd units for pronghorn and mule deer (Table 3.7) The overlapping pronghorn herd unit, Pumpkin Buttes (PR309), exceeded its population objective in 2011, while the mule deer herd unit (Pumpkin Buttes [MD320]) was below population objective. The mule deer herd exceeded its population objectives from 2002 to 2010, but began to decline in 2006. This trend corresponds with recent studies showing that mule deer populations are experiencing a decline in overall numbers and herd size in Wyoming due to various factors (Sawyer et al. 2009). Contrary to this trend, the mule deer population residing in the Pumpkin Buttes Herd Unit was expected to increase slightly in 2012 due to favorable weather conditions and conservative hunting seasons (WGFD 2011b).

Table 3.7. Some Big Game Ranges and Herd Units in the Proposal Area

Common Name	Range Acres in Project Area[1]		Herd Units in Project Area	Herd Units Objective Population Size[2]
	Winter/Yearlong	*Yearlong*		
Pronghorn Antelope	17,861.8	0	Pumpkin Buttes (PR309)	**Above** objective of 18,000 individuals by 46%
Mule Deer	11,580.0	6,281.7	Pumpkin Buttes (MD320)	**Below** objective of 11,000 individuals by 13%

[1] WGFD 2012
[2] WGFD 2011b

3.7.2. Non-Game

3.7.2.1. Raptors

The PRB FEIS discussed the affected environment for raptors on pp. 3-141 to 3-148. Aerial and ground surveys conducted by BHEC biologists between May and June 2012 identified 6 active and 30 inactive raptor nests within 0.5 mile of the proposed well pads. Active raptor nests included 3 red-tailed hawk nests, 1 burrowing owl nest, 1 unknown owl nest, and 1 golden eagle nest (Table 3.8) (BHEC 2012). The golden eagle nest failed to produce young. Although 3 adult bald eagles were observed within a 1.0-mile buffer of the proposed well pads during winter surveys in December 2011 and January and February 2012, no nests were identified. For a complete list of historical raptor nests within 0.5 mile of the proposed well pads, see Appendices B and E-2. Suitable nesting habitat is present in the project area.

Table 3.8. Active Raptor Nests within 0.5 Mile of Proposed Well Pads (2012)

Nest ID #	Species	Nest Condition	Proposed Well Pads within 2 Miles	Miles from Well Pad	Direction from Well Pad
10672	Golden Eagle	Fair	Mojave Fed 4377-27-34	0.48	NE
10666	Unknown Owl	Good	Mojave Fed 4377-27-34	0.48	W
5664	Red-tailed Hawk	Good	Mojave Fed 4277-26-41	0.16	SE
11372	Burrowing Owl	Unknown	Mojave Fed 4377-6-44	0.48	NW
1978	Red-tailed Hawk	Good	Mojave Fed 4277-11-31	0.15	S
1976	Red-tailed Hawk	Good	Mojave Fed 4277-11-31	0.33	N

Source: BHEC 2012

During the October 29 and 30, 2012 project on-site, the BLM biologist identified the following additional considerations regarding raptor nests near proposed well pads in the project area:

- Mojave Fed 4377-6-44: Raptor nest #11308 is within line-of-site and 0.25 mile of the proposed disturbance.
- Mojave Fed 4377-9-11: Raptor nests are present within line-of-site and 0.5 mile of the proposed disturbance.
- Mojave Fed 4377-27-34: Proposed well and access road are out of line-of-sight of all raptor nests present within 0.5 mile.
- Mojave Fed 4277-11-31: Proposed wells and access are partially in line-of-sight of red-tailed hawk nest #1979 and in line of sight of nests #1978 and 11298. The wells are slightly closer than the 0.25 mile recommended by the U.S. Fish and Wildlife Service (FWS), but other facilities (heater-treater and tank load out) are further than 0.25 mile.
- Mojave Fed 4277-14-41: Proposed well and access are 0.25 miles from and in the line-of-sight of nest #4897. The nest has been in poor condition and inactive for 4 years, and is likely to be a black-billed magpie nest.
- Mojave Fed 4277-27-31: Proposed well and access are within 0.5 mile, but out of line-of-sight of several ground nests likely to have been built by ferruginous hawks.
- Mojave Fed 4277-26-41: Proposed well and access are within 0.5 mile of several raptor nests. BLM did not find nest #5664 at the on-site, but substrate is still intact. The nest was active in 2011 and 2012 by red-tailed hawks. The nest was about 0.23 mile from the wells, but facilities requiring human visitation will be placed farther east.

3.7.2.2. Migratory Birds

Migratory birds are birds that migrate for breeding and foraging at some point in the year. The PRB FEIS discussed the affected environment for migratory birds on pp. 3-150 to 3-153. The BLM-USFWS Memorandum of Understanding (MOU) (2010) promotes the conservation of migratory birds, complying with Executive Order 13186 (Federal Register V. 66, No. 11). BLM must include migratory birds in every NEPA analysis of actions that have potential to affect migratory bird species of concern to fulfill obligations under the Migratory Bird Treaty Act (MBTA). The MBTA (and Bald and Golden Eagle Protection Act [BGEPA]) are strict liability statutes so require no intent to harm migratory birds through prosecuting a taking. Recent prosecutions or settlements in Wyoming and the West cost companies millions of dollars in fines and restitution (retrofitting powerlines to discourage perching to minimize electrocution or shielding ponds holding toxic substances). BLM encourages voluntary design features and conservation measures supporting migratory bird conservation, in addition to appropriate restrictions.

The WGFD Wyoming Bird Conservation Plan (Nicholoff 2003) identified 3 groups of high-priority bird species in Wyoming: Level I, those that clearly need conservation action; Level II, species where the focus is on monitoring, rather than active conservation; and Level III, species that are not a high priority but are of local interest. Short-grass prairie and shrub-steppe vegetation dominate the project area. Many species that are of high management concern use shrub-steppe areas for their primary breeding habitats (Saab and Rich 1997). Nationally, grassland and shrubland birds declined more consistently in the last 30

years than any other ecological association of birds (WGFD 2009). Species that may occur in these vegetation types in northeast Wyoming, according to the Wyoming Bird Conservation Plan, appear in Table 3.9 grouped by level as identified in the plan.

Most of the birds listed in Table 3.9 typically nest either on the ground or in shrubs. During the October 29 and 30, 2012 project on-site, the BLM identified suitable nesting habitat for sagebrush obligate passerines at these proposed well pads: Mojave Fed 4377-17-44, Mojave Fed 4377-28-31, Mojave Fed 4377-20-44, Mojave Fed 4377-27-34, Mojave Fed 4277-11-31, and Mojave Fed 4277-27-31. Nests were in sagebrush scrub in or near the proposed disturbance at well pads Mojave Fed 4377-17-44 and Mojave Fed 4377-28-31. Several migratory species are also BLM special status (sensitive) species (SSS). Those known or suspected to occur in this area include bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk (*Buteo regalis*), long-billed curlew (*Numenius Americana*), Brewer's sparrow (*Spizella breweri*), sage sparrow (*Amphispiza belli*), mountain plover (*Charadrius montanus*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), and sage thrasher (*Oreoscoptes montanus*).

Table 3.9. Partners In Flight Priority Migratory Bird Species Potentially in the Project Area

Common Name	Scientific Name	Habitat Type[1]	Distribution[2]	WY BLM SSS[3]
Level I Species (Conservation Action)				
Ferruginous Hawk	*Buteo regalis*	SS/SGP	B	Yes
Short-eared Owl	*Asio flammeus*	SGP	O	No
Upland Sandpiper	*Bartramia longicauda*	SGP	No Verified Records	No
Baird's Sparrow	*Ammodramus bairdii*	Not Classified	No Verified Records	Yes
Long-billed Curlew	*Numenius americana*	SGP	O	Yes
Brewer's Sparrow	*Spizella breweri*	SS	b	Yes
Sage Sparrow	*Amphispiza belli*	SS	O	Yes
Mountain Plover	*Charadrius montanus*	SS/SGP	O	Yes
Burrowing Owl	*Athene cunicularia*	SGP	B	Yes
McCown's Longspur	*Calcarius mccownii*	SS/SGP	b	No
Level II Species (Monitoring)				
Loggerhead Shrike	*Lanius ludovicianus*	SS	B	Yes
Sage Thrasher	*Oreoscoptes montanus*	SS	b	Yes
Vesper Sparrow	*Pooecetes gramineus*	SS	B	No
Lark Sparrow	*Chondestes grammacus*	SS	B	No
Lark Bunting	*Calamospiza melanocorys*	SS/SGP	B	No
Grasshopper Sparrow	*Ammodramus savannarum*	SS/SGP	b	No
Bobolink	*Dolichonyx oryzivorus*	SGP	O	No
Level III Species (Local Interest)				
Common Poorwill	*Phalaenoptilus nuttallii*	SS	O	No
Say's Phoebe	*Sayornis saya*	SS	B	No

[1] GAP vegetation cover types (BLM 1996) were identified through GIS analysis and mapped to the following avian habitat groupings (Nicholoff 2003): SS-Shrub-steppe; SGP-Shortgrass prairie
[2] Orabona et al. 2012. Definitions for symbols used to report WY Distribution Areas are: B-Nest or young dependent upon parent birds was observed; b- Circumstantial evidence of nesting; O-The species has been observed, but there was no evidence of nesting.
[3] REF 0032 [SSS – special status (sensitive) species]

3.7.3. Threatened, Endangered, Candidate, Special Status (Sensitive) Species (SSS)

The Buffalo BLM receives a species list periodically from the FWS concerning threatened, endangered and candidate species. The 2012 list included Ute Ladies'-tresses orchid (threatened) and Greater Sage-Grouse (candidate).

3.7.3.1. Ute Ladies'-Tresses Orchid (ULT)

The FWS lists the Ute ladies'-tresses orchid as threatened. The PRB FEIS discussed the affected

environment for ULT on p. 3-175, which BLM incorporates here by reference. The Wyoming Natural Diversity Database model for ULT predicts undocumented populations may be present in southern Campbell and northern Converse Counties. Scientists documented 4 orchid populations in Wyoming prior to 2005. Scientists found 5 additional sites in 2005 and 1 in 2006. The new locations were in the same drainages as the original populations, with 2 on the same tributary and within a few miles of an original discovery. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County. A lack of perennial water sources and the heavy clay soils present in the limited acreage of ephemeral drainages in the project area reduce the potential for ULT (BHEC 2012). The lack of suitable habitat, combined with the absence of existing or historic populations in the project area to provide a seed source, as evidenced by the negative results of at least 6 prior surveys conducted in Johnson County between 1995 and 2006 (as documented in Heidel 2007, Table 1) and a survey conducted by BHEC in 2012 (BHEC 2012), make it unlikely that the project area would support a future population of ULT.

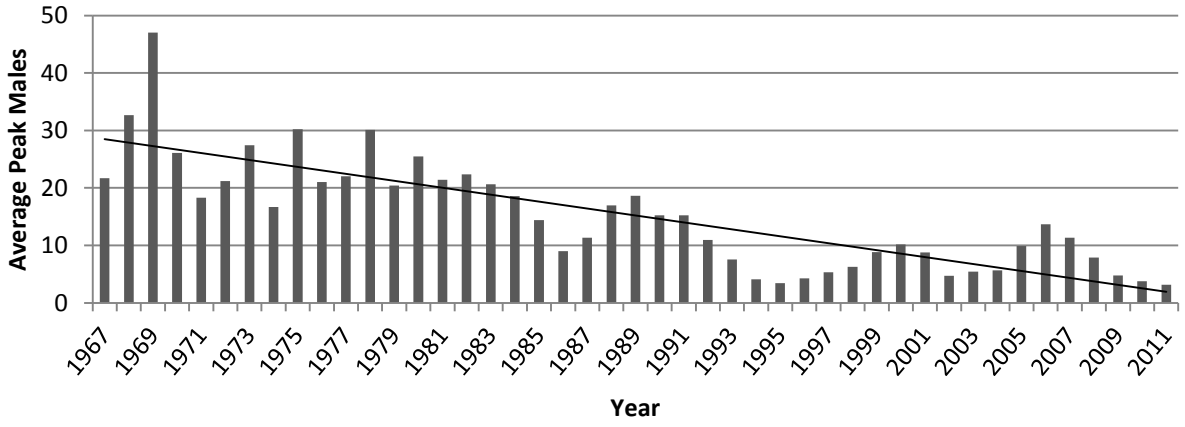
3.7.4. Candidate Species

3.7.4.1. Greater Sage-Grouse (GSG)

The PRB FEIS has a detailed discussion on GSG ecology and habitat on pp. 3-194 to 3-199. Subsequently the FWS determined the GSG warrants federal listing as threatened across its range, but precluded listing due to other higher priority listing actions (75 Fed. Reg. 13910 to 14014, Mar. 23, 2010; 75 Fed. Reg. 69222 to 69294, Nov. 10, 2010). GSG are a Wyoming BLM special status (sensitive) species (SSS) and a WGFD species of greatest conservation need because of population decline and ongoing habitat loss. The 2012 population viability analysis for the Northeast Wyoming GSG found there remains a viable population of GSG in the PRB; however, threats from energy development and West Nile Virus are impacting future viability (Taylor et al. 2012). The BLM Instructional Memorandums (IM) WY-2012-019, WO IM-2012-044, and -043 establish interim management policies for proposed activities on BLM-administered lands, including federal mineral estate, until RMP updates are complete.

The GSG population in northeast Wyoming is exhibiting a steady long term downward trend, as measured by lek attendance (WGFD 2011a). Figure 1 illustrates a 10-year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak. Research suggests that the declines since 2001 are a result, in part, of energy development (FWS 2010; Taylor et al. 2012).

Figure 1. Average Peak Number of GSG Males at WGFD Count Leks by Year in the PRB



This proposal area is not in identified GSG preliminary priority (core) habitat (PPH) areas and current GSG mapping identified no leks in the project area; however, 15 leks are within 4 miles of the project area boundary (BLM 2012). Aerial and ground surveys conducted in April 2012 identified 2 active and 3

inactive GSG leks within 2 miles of the proposed well pads (BHEC 2012). The Bushwhacker Creek IV lek is within 2 miles of 2 of the proposed well pads (4 wells). The Bushwhacker Creek III lek is within 2 miles of 1 of the proposed well pads (3 wells) (**Error! Reference source not found.**). Three hens were observed at the Bushwhacker Creek IV lek in April of 2012. Although no males were sighted, vocalizations were heard. The Bushwhacker Creek III lek had a peak male count of 4. Three of the leks surveyed, Bushwhacker I, II, and V, were inactive in 2012 (BHEC 2012).

According to the WGFD guidance for non-core leks, moderate impacts occur when well density is between 1 and 2 well pad locations per square mile or where there is less than 20 acres of disturbance per square mile; high impacts occur when well density is between 2 and 3 well pad locations per square mile or when there are between 20 and 60 acres of disturbance per square mile; and extreme impacts occur when well density exceeds 3 well pad locations per square mile or when there are greater than 60 acres of disturbance per square mile. Both the Bushwhacker Creek IV and Bushwhacker Creek III leks are experiencing extreme impacts according to parameters set by WGFD (2009). Of the 15 leks within 4 miles of the project area, 12 are experiencing extreme impacts, 2 are experiencing high impacts, and 1 is experiencing low impacts. Two of the leks are in GSG PPH (core area) habitat.

Table 3.10. Active GSG Leks within 4 miles of a Proposed Well Pad

Lek Name[1]	In Core Area? (Y or N)	Density of Permitted Producing Wells (wells per square mile)[2]		WGFD Category of Impact[3]
		4-mile buffer	*12.4-mile buffer*	
37-Rhodes	N	3.1	2.9	extreme
38-Beecher Draw	N	8.4	4.8	extreme
38-Beecher Draw N	N	8.8	5.1	extreme
38-Bushwacker Creek IV	N	8.0	3.9	extreme
38-Bushwacker Creek V	N	6.9	3.6	extreme
38-Bushwhacker Creek I	N	8.3	4.1	extreme
38-Bushwhacker Creek II	N	6.7	3.5	extreme
38-Bushwhacker Creek III	N	3.9	2.9	extreme
38-Cedar Canyon	N	4.6	4.4	extreme
38-Cottonwood Creek 1	N	6.6	5.2	extreme
38-East Holler	N	2.8	3.4	high
38-Garrett	Y	0.9	3.0	low
38-Garrett 2	Y	2.0	3.3	high
38-Mengel	N	6.5	4.1	extreme
38-Rhodes 2	N	3.9	3.0	extreme

[1] BLM 2012
[2] The locations of permitted and producing oil and gas wells are from the WOGCC online database (WOGCC 2012).
[3] Calculated based on wells within a 4-mile buffer of leks.

Impacts from oil and gas development are discernible at the spatial scale of 20 km (12.4 mi) (Taylor et al. 2012). These findings echo results from previous studies conducted in the basin, wherein biologists observed basin-wide population declines (Walker et al. 2007). There are 48 documented leks within 12.4 miles of the proposal boundary; see Appendix E-2. Appendix C lists the leks within 12.4 miles of this proposal's boundary and the WGFD impact category, as assessed within a 4 mile buffer of each lek.

Site Specific Habitat: The project is on the eastern edge of Wyoming's GSG range. The Buffalo PPH area is about 1.5 miles northwest of the project area. During the October 29 and 30, 2012 project on-site, the BLM identified these additional considerations regarding potential GSG habitat near proposed well pads:

- Mojave Fed 4377-7-44: Marginal habitat for GSG was identified in areas of proposed disturbance and surrounding areas.

- Mojave Fed 4377-17-44, Mojave Fed 4377-28-31, Mojave Fed 4377-20-44, Mojave Fed 4377-27-34, Mojave Fed 4377-11-31, Mojave Fed 4377-14-41, and Mojave Fed 4377-27-31: Suitable to high-quality GSG habitat was identified in areas of proposed disturbance and surrounding areas.

3.7.5. Special Status (Sensitive) Species (SSS)

The PRB FEIS discussed the affected environment for SSS, pp. 3-174 to 3-201. The authority for the SSS comes from the ESA, as amended; Title II of the Sikes Act, as amended; the FLPMA; Department Manual 235.1.1A; and BLM Manual 6840. Appendix D lists those SSS that may occur in the project area, and additional information on these species appears below. The table also includes a brief description of the habitat requirements for each species and an assessment of potential impacts. Wyoming BLM updates its list of SSS to focus management to maintain habitats to preclude listing as a threatened or endangered species. The policy goals are:

- Maintaining vulnerable species and habitat components in functional BLM ecosystems;
- Ensuring sensitive species are considered in land management decisions;
- Preventing a need for species listing under the Endangered Species Act (ESA); and
- Prioritizing needed conservation work with an emphasis on habitat.

Wyoming BLM updates SSS on its website: http://www.blm.gov/wy/st/en/programs/Wildlife.html. BLM discusses those SSS affected beyond the level analyzed in the PRB FEIS, below. The PRB FEIS discussed impacts to SSS on pp. 4-257 to 4-265. BLM will take actions to meet the policies set forth in sensitive species policy (BLM Manual 6840). BLM Manual 6840.22A states that "The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary."

3.7.5.1. Black-tailed Prairie Dog

The PRB FEIS discussed the affected environment for black-tailed prairie dogs on p. 3-179. When BLM wrote the PRB FEIS the black-tailed prairie dog was a candidate species for federal listing as threatened (FWS 2000). It was then removed from the list in 2004, when the FWS determined that it was unlikely to become an endangered species within the foreseeable future (FWS 2004). Black-tailed prairie dogs were also removed from the WGFD list of Species of Greatest Conservation Need in 2010, citing the security of regional populations of the species despite a naturally restricted Wyoming population (WGFD 2010a). The Wyoming BLM considers the black-tailed prairie dog a sensitive species (REF 0032) and continues to afford this species the protections described in the PRB FEIS. Twelve black-tailed prairie dog colonies were identified within 0.25 mile of the proposed wells, with a combined area of 9,034 acres (BHEC 2012). Eight of the colonies, comprising 8,553 acres, were active in 2012 (BHEC 2012).

3.7.5.2. Bald Eagle

The PRB FEIS discussed the affected environment for bald eagles on p. 3-175. The ESA listed the bald eagle as a threatened species when BLM approved the PRB FEIS. FWS removed the bald eagle from the ESA protection on August 8, 2007. The bald eagle has protection under the Bald and Golden Eagle Protection Act (BGEPA) and the MBTA. BHEC observed 3 adult bald eagles within 1 mile of the proposed wells during winter surveys in 2012, but saw no nests (BHEC 2012). During the October 29 and 30, 2012 project on-site, BLM identified marginal bald eagle roosting habitat within 0.5 miles of 5 of the proposed well pads (Mojave Fed 4377-9-11, Mojave Fed 4377-17-44, Mojave Fed 4377-27-34, Mojave Fed 4277-11-31, and Mojave Fed 4277-14-4). The limits of nesting and winter roosting habitats is due to the lack of suitable trees and open water sources the bald eagle typically frequents. Bald eagle use of the project area is likely limited to a minimal amount of daytime foraging and roosting.

3.7.5.3. Ferruginous Hawk

The PRB FEIS discussed the affected environment for ferruginous hawk, p. 3-183. The species is widely distributed; its population status and trends are unknown, but are suspected stable. Populations are experiencing habitat loss. They are sensitive to human disturbance. In the PRB, this hawk inhabits grasslands, and sagebrush shrublands. They typically are ground nesters, increasing exposure to ground predators. BLM identified several inactive ground nests potentially built by the species within 0.5 miles of the proposed Mojave Fed 4277-27-31 well pad during the October 2012 onsite inspection.

3.7.5.4. Western Burrowing Owl

Additional information regarding western burrowing owl is available in the PRB FEIS, on p. 3-186, and the Thunder Basin National Grassland FEIS, Appendix H Biological Assessment and Evaluation, pp. H-190 to H-199. The sparsely vegetated grasslands of the Thunder Basin National Grassland offer similar burrowing owl habitat to that present in the project area. Current population estimates for the burrowing owls in the U.S. are not well known but trend data suggest declines throughout the burrowing owl range (McDonald et al. 2004; USFS 2001). Primary threats are habitat loss and fragmentation, mostly due to intensive agricultural and urban development, and habitat degradation (Klute et al. 2003). Black-tailed prairie dog colonies provide the primary habitat for burrowing owls (Klute et al. 2003). BHEC saw 1 active burrowing owl nest in the project area during 2012 field surveys (BHEC 2012). During the October 29 and 30, 2012 project on-site, the BLM biologist also identified suitable nesting habitat for burrowing owls in or adjacent to 6 proposed well pads (Mojave Fed 4377-5-24, Mojave Fed 4377-6-44, Mojave Fed 4377-9-11, Mojave Fed 4377-7-44, Mojave Fed 4277-14-41, and Mojave Fed 4277-26-41).

3.7.5.5. Loggerhead Shrike

The PRB FEIS discussed the affected environment for loggerhead shrike, p. 3-187. Suitable habitat was identified in the project area during 2012 surveys by BHEC (BHEC 2012).

3.7.5.6. Long-billed Curlew

The PRB FEIS discussed the affected environment for long-billed curlew on p. 3-184. Sagebrush grasslands and prairie dog towns occurring in the project area may provide suitable habitat for long-billed curlews, and the species is suspected to occur.

3.7.5.7. Mountain Plover

The PRB FEIS discussed the affected environment for mountain plover, pp. 3-177 to 3-178. The FWS proposed the mountain plover for ESA listing as a threatened species when BLM approved the PRB FEIS. The FWS withdrew the proposal. On June 29, 2010, the FWS reinstated a December 5, 2002 proposed rule (67 FR 72396) to list the bird as a threatened species. On May 12, 2011, the FWS withdrew the proposal to list the mountain plover as a threatened species. Although no mountain plover were observed in the project area during 2012 surveys, 12 black-tailed prairie dog colonies that offer suitable habitat for mountain plover were identified within 0.25 mile of the proposed wells (BHEC 2012).

3.7.5.8. Sage Thrasher

The PRB FEIS discussed the affected environment for sage thrasher, pp. 3-199 to 3-200. BHEC saw suitable sage thrasher habitat during 2012 surveys (BHEC 2012), and the species is suspected to occur in the project area. During the on-site visits, the BLM biologist identified passerine nests built in sagebrush within the disturbance areas of the Mojave Fed 4377-17-44 and Mojave Fed 4377-28-31 well pads.

3.7.5.9. Brewer's Sparrow

The PRB FEIS discussed the affected environment for Brewer's sparrow on p. 3-200. The Brewer's sparrow is dependent on shrub-dominated plant communities that provide protective cover, song perches, and nest sites, and nests in sagebrush throughout the species' range. Suitable habitat for Brewer's sparrow exists in the project area (BHEC 2012) and the species is suspected to occur. During the on-site visits, the

BLM biologist identified passerine nests built in sagebrush within the disturbance areas of the Mojave Fed 4377-17-44 and Mojave Fed 4377-28-31 well pads.

3.7.5.10. Baird's Sparrow

The PRB FEIS discussed the affected environment for Baird's sparrow on p. 3-188. Suitable habitat for Baird's sparrow was identified in the project area during 2012 surveys (BHEC 2012), and the species is suspected to occur.

3.7.5.11. Swift Fox

The PRB FEIS discussed the affected environment for swift fox on p. 3-189. A swift fox was observed in the project area during 2012 surveys (BHEC 2012). During the October 29 and 30, 2012 project on-site, the BLM identified suitable foraging and/or denning habitat for swift fox in or adjacent to 10 proposed well pads (Mojave Fed 4377-5-24, Mojave Fed 4377-6-44, Mojave Fed 4377-9-11, Mojave Fed 4377-17-44, Mojave Fed 4377-7-44, Mojave Fed 4377-28-31, Mojave Fed 4377-20-44, Mojave Fed 4377-27-34, Mojave Fed 4277-14-41, and Mojave Fed 4277-11-31). BLM anticipates the project will not have effects to the swift fox, beyond those described in the PRBFEIS, so it will not be analyzed further.

3.7.6. Aquatics

The PRB FEIS has a detailed discussion of aquatic ecosystems and fisheries in the project area on pp. 3-153 to 3-166. The project area lies entirely in the Upper Powder River watershed (HUC 8-digit code: 10090202). No perennial waterways are in the project area boundary; however, several intermittent tributaries that drain to the Powder River west of the project area are present, including Bullwhacker Creek, Dry Fork Powder River, Horse Creek, Little Bullwhacker Creek, and an unnamed tributary. These waterways are unlikely to contain fish, and therefore no further analysis is included in this EA.

3.8. Cultural Resources

Eight Class III cultural resource inventories were performed for the Sahara POD prior to on-the-ground project work (BFO project #s. 70110094, 70120001, 70120004, 70120079, 70120080, 70120081, 70120082, and 70120083). Lance provided a Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) and the *Wyoming State Historic Preservation Office Format, Guidelines, and Standards for Class II and III Reports*. Ardeth Hahn, BLM Archaeologist, reviewed the reports for technical adequacy and compliance with BLM standards and determined them to be adequate. Table 3.11 shows resources in or near the proposal. Field inspections verified that none of the proposed wells are visible from contributing portions of National Register of Historic Places (NRHP) Listed Site 48JO134, the Bozeman Trail.

Table 3.11. Cultural Resources Located in or near the Project Area

Site Number	Site Type	Eligibility	Site Number	Site Type	Eligibility
48JO134	Bozeman Trail	Listed on the NRHP	48JO863	Prehistoric Site	Not Eligible
48JO862	Prehistoric Site	Not Eligible	48JO3325	Historic & Prehistoric Site	Not Eligible

4. ENVIRONMENTAL EFFECTS

BLM analyzed the no action alternative as Alternative 3 in the PRB FEIS and it subsequently received augmentation of the effects analysis in this EA through the analysis of mineral development projects, their approval, and construction; the analysis and approval of grazing allotments; and through the analysis and approval of other projects. BLM incorporates by reference these analyses in this EA; see Table 3.1. This project area contains approximately 130.4 acres of surface disturbance from existing roads, well pads, and other oil and gas related facilities. Under the no action alternative, on-going well field operations would continue, as would the development of 208 approved wells and other approved fee and federal APDs. Activities for production and the drilling and completion of these new wells would result in noise and

human presence that could affect certain resources in the project area; these effects could include the disruption of wildlife, the dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic. Present fluid mineral development in the PRB is under half of that envisioned and analyzed in the PRB FEIS. There is only a remote potential for significant effects above those identified in the PRB FEIS to resource issues as a result of implementing the no action alternative.

BLM recommend Alternative B as the preferred alternative and its analysis is follows, below.

4.1. Air Quality

4.1.1. Direct and Indirect Effects

Project area air quality could be affected during construction (due to surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, and drilling rig and vehicle engine exhaust and production, including well production equipment and booster and pipeline compression engine exhaust). Air quality impacts modeled in the PRB FEIS and Cumulative Air Quality Effects 2009 concluded that PRB projected fluid and solid development would not violate state, tribal, or federal air quality standards and this project is well within the projected development parameters, in addition to the 2011 ozone standards. This EA incorporates the air quality analysis in the draft Crazy Cat East EA, which estimated per well criteria pollutant emissions for typical conventional oil and gas and CBNG wells in the PRB during pad construction, drilling/completion, and production phases. Based on that analysis, no violations to the NAAQS would be anticipated from implementation of the proposed action. Localized, short-term, increases in NO_X, CO, VOCs, and PM_{10} concentrations would occur, but maximum concentrations would be well below applicable state and federal criteria. Air pollutants in the vicinity would return to background levels at the end of production and would be de minimis during the production phase.

4.1.2. Cumulative Effects

Cumulative air quality impacts were assessed for the WY PRB. The PRB FEIS discusses the cumulative effects to air quality, pp. 4-386 to 4-392. For each alternative, potential air pollutant project sources were combined with non-project sources, including sources from the Montana Statewide Oil and Gas EIS, to determine the total potential cumulative air quality impacts. The analysis in the PRB FEIS compared potential air quality impacts from 4 alternatives to applicable ambient air quality standards and PSD increments, but comparisons to the PSD Class I and II increments were intended to evaluate a threshold of concern for potential impacts and did not represent a regulatory PSD Increment Consumption Analysis. The proposed action would contribute to the cumulative impacts described in the PRB FEIS. The Update of the Task 3A Report for the Powder River Basin Coal Review Cumulative Air Quality Effects for 2020 also evaluated the air quality-related environmental impacts of ongoing development in the region, to which the proposed action would contribute.

4.1.3. Mitigation Measures

The BLM proposes no additional mitigation beyond the operator committed measures.

4.1.4. Residual Effects

BLM anticipates no residual effects.

4.2. Soils and Vegetation

4.2.1. Direct and Indirect Effects

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

The effects to soils resulting from well pad and access road construction include:

- Mixing of horizons—occurs where construction on roads, or other activities take place. Mixing may result in removal or relocation of organic matter and nutrients to depths where they would be

unavailable for vegetative use. Soils that are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts, or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.

- Loss of soil vegetation cover, biologic crusts, organic matter, and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Soil erosion would also affect soil health and productivity. Erosion rates are site specific and are dependent on soil, climate, topography, and cover.
- Soil compaction - the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery.
- Modification of hill slope hydrology.
- Soil rutting affects the surface hydrology as well as the rooting environment. The rutting process severs roots, results in topsoil and subsoil mixing, and disrupts natural surface water hydrology.
- Direct effects (removal and/or compaction) to vegetation would occur from ground disturbance caused by drilling rig equipment and construction of well pads, tank batteries, and roads. Short term effects would occur where vegetated areas are disturbed but later reclaimed. Long-term effects would occur where well pads, compressor stations, roads, water-handling facilities, or other semi-permanent facilities may result in loss of vegetation and affect reclamation success for the life of the project.
- Soils will be subjected to wind and water erosion.

The PRB FEIS discusses direct and indirect effects to ecological sites and vegetation, pp. 4-153 to 4-164. The proposal would affect the common plant communities that occur on the site and the transition communities. Direct effects (removal and/or compaction) to vegetation and ecological sites would occur from ground disturbance caused by construction of well pads, roads, and transmission lines. Short term effects would occur where vegetated areas are disturbed but later reclaimed through interim reclamation. Long-term effects would occur where project features not reclaimed through interim reclamation may result in loss of vegetation and affect reclamation success for the life of the project. In particular, stands of Wyoming big sagebrush will be affected. Documentation shows sagebrush does not come back easily after human disturbance such as urban or agricultural development, or even after natural occurrences such as wildfire. It takes years for sagebrush to fully grow back. For example, sagebrush has not returned to some areas of the Columbia Basin burned by a large fire 40 years ago (PNNL 2012).

Lance, in coordination with the BLM, planned their project to maximize fluid mineral recovery while avoiding areas with major soil limitations (i.e., slopes in excess of 25%, high wind and water erosion potential, and LRP areas) to the extent practicable. Lance planned access to the proposed wells to maximize the use of existing oil and gas access roads, thereby reducing the need for new road disturbances. Design features for the proposed action described in the Sahara POD Surface Use Plan Of Operations, APD design summaries, Transportation Planning Map, and Road Engineering Plans would also limit erosional effects to soils and the creation of new LRP areas, as well as bolster reclamation success in areas with previously (non-proposed action related) disturbed soils. These design features, which specify proper surface grading, erosion and drainage control, site stabilization, and the use of soil amendments to increase soil fertility, were selected based on the unique soils, vegetation, and topography present at each well pad or access road site. Refer to the Sahara POD Reclamation Plan for a description of limiting soil characteristics identified at each well pad location and the corresponding interim and final reclamation approaches that would be used to address these potential issues. Application of site reclamation and management strategies detailed in the Sahara POD Reclamation Plan and Integrated Weed and Pest Management Plan will further reduce impacts to soils, vegetation, and ecological sites.

Lance proposed engineered road segments to provide safe access to the Mojave Fed 4377-27-34 and Mojave Fed 4277-11-31 well pads; refer to the Road Engineering Plans for details. These engineered road segments will be completed, including any culverts, low water crossings, and required surfacing, before the drilling rigs or other equipment is moved onto the pad in order to protect erodible soils. Soils identified as having severe water erosion potential within the project area are traversed by existing roads that will be used to access the proposed well pads. Upgrades to segments of an existing road used to access the Mojave Fed 4377-27-34 well pad may result in additional disturbance within these erosion-prone areas. The proposed road to access the Mojave Fed 4377-11-31 may cross shallow sandy soils.

4.2.2. Cumulative Effects

For cumulative effects to soils, refer to the PRB FEIS, pp. 4-1 and 4-151. Most soil disturbances would be short-term impacts with expedient interim reclamation and site stabilization, as in the Sahara POD Reclamation Plan and SUPO. Cumulative impacts to soil from erosion, sediment transport, and altered hydrology would also be minimized through the application of road and well pad design features described in the Sahara POD SUPO, APD design summaries, Transportation Planning Map, and Road Engineering Plans. The PRB FEIS discusses the cumulative effects to ecological sites, pp. 4-153 to 4-172. Cumulative effects to ecological sites include the alteration of disturbance regimes from the increased disturbance, increase in noxious weeds, and alterations in the vegetation community's diversity and cover.

4.2.3. Mitigation Measures

The proponent planned their project to maximize the fluid mineral drainage while avoiding areas with soil limitation where possible. The proponent also designed the infrastructure such that no engineering roads will be required and existing oil/gas roads, to the extent possible, will be used to access the proposed well locations. The constructed well pads were placed and designed to minimize cut and fill slopes. Operator committed measures committed to in the MSUP, Reclamation Plan and pad design drawings will rectify impacted areas by repairing, rehabilitating and/or restoring the affected environment. The operator's design features will reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action. For a detailed description of design features, operator committed measures and construction practices associated with the proposed project, refer to the surface use plan (SUP), Reclamation Plan and the subject APD for pad design drawings.

4.2.4. Residual Effects

Residual effects across the POD would include a long-term loss of soil productivity and vegetation associated with well pad and road areas. The PRB FEIS identified residual effects (p. 4-408) such as limited of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established. Although areas with major soil limitations were avoided in the siting of well pad and access road locations, erosion will still occur. Geomorphic effects of roads and other surface disturbance range from chronic and long-term contributions of sediment into waters of the state to catastrophic effects associated with mass failures of road fill material during large storms. Roads can affect geomorphic processes primarily by accelerating erosion from the road surface and prism itself through mass failures and surface erosion processes; directly affecting stream channel structure and geometry; altering surface flow paths, leading to diversion or extension of channels onto previously unchannelized portions of the landscape; and causing interactions among water, sediment, and debris at road-stream crossings. Rilling and gullying of cut and fill slopes on access and utility corridors will take place. Grazing by livestock on stabilized cut and fill slopes will affect soil stability and vegetation establishment. The alteration of biodiversity of ecological sites could result from disturbance, alterations in vegetation in reclaimed areas, and the spread and establishment of weed species.

4.3. Water Resources

Applied design features and applicant committed measures including use of a closed-loop drilling system, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing

failure, and using proper cementing procedures should protect fresh water aquifers above the drilling target zone. Compliance with the Sahara POD drilling plan and Onshore Oil and Gas Orders Nos. 2 and 7 will avoid adverse impacts on ground water. The WSEO, WDEQ, and WOGCC regulate waters and chemicals for drilling: "BLM may rely on the actions of state regulators. The Interior Board of Land Appeals and federal courts recognized it is appropriate for BLM to assume a proposed action complies with state permitting requirements, and rely on state analysis when evaluating the significance of effects. Wyo. Outdoor Council v. U.S. Army Corps of Engineers, 351 F. Supp. 2d 1232, 1244 (D. Wyo. 2005); PRBRC, 180 IBLA 32, 57 (2010); Bristlecone Alliance, 179 IBLA 51, 74-77 (2010)." In the Wyoming Outdoor Council, the District Court held the Corps may rely on the WDEQ permitting process to "ameliorate any concerns that impacts to water quality will be significant." Id.

4.3.1. Groundwater

With applied design features and applicant committed measures, there are no reasonable/foreseeable direct/indirect/cumulative or residual effects with the drilling of the proposed wells. Additionally, the cumulative industry and regulatory experience shows that thousands of wells cross the nation's largest aquifer in western Texas, Oklahoma, and Kansas with essentially no direct or indirect impact to that groundwater (see http://www.spe.org/jpt/print/archives/2010/12/10Hydraulic.pdf). Lastly, the EPA 2004 study and its on-going, detailed study of hydraulic fracturing yielded no immediate cautions, concerns, or warnings that present industry and regulatory practices endanger groundwater or require immediate changes (EPA 2004).

The target zones for the proposal are the Frontier, Mowry, Shannon, and Sussex bottom formations between depths of approximately 9,000 to 13,000 feet. Permitted non-CBNG water wells in the project area produce from depths that range from 560 to 1,945 feet below ground surface (WSEO 2012). These wells are designated for stock and miscellaneous uses. Shallow sources of groundwater will be protected from drilling, completion and production activities with the installation of a surface casing string which will be cemented all the way back to the surface. Production casing is installed inside of the surface casing. As detailed in the Sahara POD Drilling Plan, the proposed oil and gas wells would not draw water from the Fox Hills/Lance aquifer, which has an estimated depth of approximately 7,500 to 8,000 feet in the project area, and are not anticipated to result in any additional drawdown in wells near the project area. The Fox Hills Formation will be isolated by steel casing and monitored during drilling activities.
Drilling and completion activities will use water from permitted sources, including water produced as a by-product of coal bed natural gas production.

The volume of water produced by this mineral development is currently unknown, and Lance will have to produce the well for a time to be able to estimate the volume and quantity of produced water. To protect groundwater, any produced water will be transferred to permitted disposal locations. Lance will obtain BLM approval for disposal of produced water, in accordance with Onshore Oil and Gas Order No. 7. The quality of water produced in association with conventional oil and gas historically was such that surface discharge would not be possible without treatment. Initial water production is quite low in most cases. The BLM proposes no mitigation beyond Lance's applicant committed measures.

4.4. Locatable Minerals

Direct, indirect, cumulative, and residual effects of this proposal on locatable minerals may impact in-situ uranium recovery. There is potential for timing and/or location conflicts between the oil and gas and uranium development projects. Potential effects, "conflicts" with uranium development could occur where these mineral extraction activities overlap. Both Lance and any uranium mining companies will need to take the initiative to keep informed about the others' projects and design plans for pipelines, electrical power, and roads so they can optimize their own projects without impeding each other. Operator-to-operator coordination would preclude the need for federal or state solutions or mitigation measures to address conflicts.

4.5. Invasive Species

4.5.1. Direct and Indirect Effects

Direct, indirect, cumulative, and residual effects include the continuing use and maintenance of existing access roads, coupled with surface disturbance from construction of the proposed well pads, access roads, and related facilities would present opportunities for the spread of invasive species. The construction of improved roads, utilities, and other surface disturbances increase the vulnerability of adjacent ecosystems to invasion by noxious weeds. For instance, a recent study showed the expansion of cheatgrass in the Great Basin to be closely linked to nearby land uses. In that study cheatgrass was 13% more likely to be found within 700 meters of a road and 15% more likely to be found within 1 kilometer of a power line (Bradley and Mustard 2006). Plant communities in semi-arid landscapes like the project area have also been shown to be differentially susceptible to invasions originating from roadside verges based on dominant vegetation, soil moisture, nutrient levels, soil depth, disturbance, and topography (Gelbard and Belnap 2003). Due to combined effects of these factors, the susceptibility of adjacent plant communities to invasion will vary throughout the project area despite the similarity of disturbances. Research shows that cheatgrass infestation in semi-arid regions contributes to the increased frequency and severity of grassland wildfire (Balch et al. 2013).

4.5.2. Cumulative Effects

Cumulative effects across the project area would include a long-term loss of soil productivity associated with well pads and road construction. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants.

4.5.3. Mitigation Measures

The suite of applicant committed measures to identify, reduce opportunities to spread, and treat infestation of noxious weeds and invasive plants listed in the Sahara POD Integrated Pest Management Plan (IPMP) will reduce potential impacts from these species. Refer to the IPMP for a complete listing of general and species-specific applicant committed measures to address this issue.

4.5.4. Residual Effects

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

4.6. Fish and Wildlife

4.6.1. Big Game

4.6.1.1. Direct and Indirect Effects

The PRB FEIS analyzed impacts to big game, pp. 4-181 to 4-210. Impacts to big game occur through alterations in hunting, increased vehicle collisions, harassment and displacement, increased disturbance from noise and dust, changes to forage or forage availability, alterations to reproductive success, increased habitat fragmentation or degradation, or other factors that result in population declines. The proposal would disturb 187.7 acres of pronghorn and mule deer ranges, 119.5 acres of which would be reclaimed during the production phase. The Sublette Mule Deer Study (Phase II) found that mule deer avoidance around well pads and associated facilities was found to increase commensurate with the level of human activity in the area, while unmanned well pads were avoided less by comparison (Sawyer et al. 2009). Similarly, mule deer were found to avoid roadways with high levels of traffic, and showed an increased presence along roads with low to no use. As discussed in the PRB FEIS (p. 4-187), pronghorn are likely to exhibit similar avoidance behaviors to mule deer, and reduce their use of habitats within 1/8 mile of disturbance (Rost and Bailey 1979). All the proposed wells occur in areas with existing wells and associated infrastructure, as well as human activity from maintenance and operations. The placement of

well pads near existing disturbance limits potential impacts from development and human activity in new portions of the project area. Applicant committed measures will reduce potential impacts to big game. Protective measures include speed limits on roads to minimize collisions and dust, prompt reseeding of disturbed areas, and a company policy prohibiting free-standing liquids, which is enforced by quarterly SPCC inspections. Refer to the Sahara POD SUPO and IPMP for additional information.

4.6.1.2. Cumulative Effects

Refer to the PRB FEIS for big game cumulative impacts, p. 4-211.

4.6.1.3. Mitigation Measures

The BLM proposes no additional mitigation beyond the operator committed measures included in the Sahara POD SUPO and Reclamation Plan.

4.6.1.4. Residual Effects

No residual effects are anticipated.

4.6.2. Non-Game

4.6.2.1. Raptors

4.6.2.1.1. Direct and Indirect Effects

The PRB FEIS analyzed direct and indirect effects to raptors, pp. 4-216 to 4-221. The proposal will result in disturbances in proximity to nesting raptors, causing the direct loss of foraging habitats and indirect losses associated with declines in habitat effectiveness. All raptors using nests in the project vicinity will likely be affected to some extent by human disruption from operation and maintenance activities. Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (2002) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. Disruptive activities that will impact breeding/nesting pairs of raptors nesting in close proximity to the Sahara POD include: noise, out of vehicle activities from well operations, additional traffic, and human and equipment disruption associated with drilling, completion, operations and maintenance activities (workover/drilling rig, frac-tanks, water trucks, multiple large vehicles on the well pad at one time) occurring throughout the year. Lance describes activities that will occur during completion of proposed wells in its Surface Use Plan of Operations (SUPO) for the Sahara POD. Lance estimates that approximately 90,000 barrels of water will be required to complete each well, resulting in 700 round-trips by tanker trucks to fill holding tanks at each well (SUPO, Water Usage, page 7). Water will be held in 120 to 170 storage tanks on the well pad, or in a large capacity tank in addition to 30 tanks. In addition, Lance estimates that 22,500 to 37,500 bbls of load recovery will be hauled off location to a permitted disposal facility, resulting in additional heavy truck traffic. Completion, including staging and stimulation activities, can last from 3 to 10 days for a typical well, and human activity and heavy truck traffic will occur 24 hours per day during that period (SUPO, Pad Size, page 10). By Lance's estimates of time and number of trucks that will be accessing the well pads during completion, tanker trucks could be arriving at the pad several times per hour. It is anticipated that the driver of each truc k will exit the vehicle to help either load out from or off load to storage tanks. Out-of-vehicle activities are generally considered more disturbing to raptors than in-vehicle activities. Stopped vehicles, particularly when occupants leave the vehicle, provoke negative responses from nesting or perching raptors more often than moving vehicles (Romin and Muck 1999). If disruptive activities occur during nesting, they could be sufficient to cause adult birds to remain away from eggs or chicks causing overheating or chilling. This can result in egg or chick death, which could constitute a violation of the MBTA. Prolonged disturbance can also lead to nest abandonment by the adults. Routine human activities near these nests can also draw increased predator activity, resulting in increased nest predation.

The following is a list of the nests that will be impacted by surface disturbing and disruptive activities (construction, drilling, completion, operations, and maintenance), impacts described above, associated with implementation of the Sahara project:

- The Mojave Fed 4377-6-44 pad is proposed approximately 0.25 miles and in the line of sight of unknown raptor nest #11308. The spatial buffer may not be sufficient to protect the nest during operations and maintenance activities, depending on what species may be using it. The FWS recommends a 1 mile spatial buffer where species has not been determined. If the nest becomes active with a species requiring a spatial buffer greater than 0.25 miles, production or maintenance activities could cause abandonment of the nest, which could result in a violation of MBTA.
- The Mojave Fed 4377-9-11 pad is proposed approximately 0.4 miles and in the line of sight of red-tailed hawk nest #2835.
- The Mojave Fed 4377-27-34 pad and associated access road occur within 0.5 miles of several raptor nests. The existing road accessing the well pad from the south occurs approximately 0.21 miles from golden eagle nest #1960 and 0.4 miles from golden eagle nest #10672. The FWS recommends a 0.5 miles spatial buffer to protect golden eagle nests. Segments of the road are proposed to be re-routed or upgraded. Unknown raptor nests #1957 and #10684 also occur within 0.5 miles of these segments. The existing road continues north and loops into the road network that will be used to access the northern portions of the POD. This road passes within approximately 120 feet of two nests of unknown species. It also occurs within 0.3 miles and direct line of sight of golden eagle nest #10672. The road appears to currently be used for CBNG development. Increased use of this road may disturb golden eagles foraging or nesting in the area, potentially resulting in a violation of BGEPA or MBTA. The 4377-27-34 pad itself is located out of the line of sight of known raptor nests in the area. This should reduce impacts to raptors from operation and maintenance activities; however, they will still be susceptible to impacts from construction, drilling, and completion of the wells.
- The Mojave Fed 4277-11-31 pad is proposed within 0.25 miles of several raptor nests. During the onsite, the BLM biologist verified these nests to be #1978, #1979, and #11298. Three other nests occur in the BLM raptor database, but are thought to be duplicates of these nests. The nests have histories of activity with both great horned owls and red-tailed hawks, sometimes with two of the nests active in the same year. Most of the infrastructure on the well pad requiring human visitation is proposed to be placed on the south side of the pad, away from the nests, providing an adequate spatial buffer as recommended by the FWS (0.25 miles for red-tailed hawks, and 0.125 for great horned owls). This should reduce impacts to raptors from operation and maintenance activities; however, they will still be susceptible to impacts from construction, drilling, and completion of the wells, which could result in a violation of the MBTA.
- The Mojave Fed 4277-26-41 pad is proposed within approximately 0.16 miles of red-tailed hawk nest #5664. The nest was active in both 2011 and 2012. The nest could not be located during the onsite; however, the cottonwood where the nest should have been is still standing and it is likely that the hawk will return to rebuild the nest in the same location, as they are known to show site fidelity. Several other nests historically occurred within 0.5 miles of the pad and access road, but have since been reported as gone. The well pad and wells are within the FWS recommended spatial buffer of 0.25 miles. If the nest is rebuilt by hawks, the spatial buffer is likely to be inadequate to protect against violations of the MBTA.

The BLM and Lance worked to reduce impacts to raptors from placement of wells and infrastructure. The following were changes made as a result of the on-site:

- Lance moved the access road to well pad Mojave Fed 4377-27-34 off of the ridgeline, specifically to stay out of the line-of-sight of golden eagle nest #10672. This should reduce impacts to raptors from operation and maintenance activities; however, they will still be susceptible to impacts from construction, drilling, and completion of the wells.
- Red-tailed hawk nest #5664, active in 2011 and 2012, is about 0.16 miles from the proposed Mojave

Fed 4277-26-41 well pad; most of the facilities requiring human visitation will be placed farther east, just slightly less than the 0.25 miles buffer recommended by FWS. This should reduce impacts to raptors from operation and maintenance activities; however, they will still be susceptible to impacts from construction, drilling, and completion of the wells, which could result in a violation of the MBTA.

BLM recommends the location of all infrastructures requiring human visitation be located to provide an adequate biologic (spatial) buffer for nesting raptors. A biologic buffer is a combination of distance and visual screening that provides nesting raptors with security such that routine well visits and maintenance activities preclude disturbing or flushing the raptors. The FWS Ecological Services Office updated recommendations for species specific spatial and seasonal buffers for breeding raptors in January 2013 in its Protections for Raptors (see Administrative Record). In the document, the FWS states that larger buffers may be necessary to prevent violations where substantial auditory or visual impacts will occur. Drilling and completions activities, with the amount of human activity, heavy truck traffic, and equipment required would result in substantial visual and auditory impacts. In this case, the protective measures afforded by the BFO RMP Record of Decision (ROD), as updated and amended, are not adequate to prevent a violation of the MBTA. The FWS raptor recommendations constitute "new data . . . and changes in circumstances" (43 CFR 1610.5-5 and 1610.56) that BLM is considering and resolving in a land use plan revision that is on-going.

The BLM received pre-onsite comments from Pauline Schuette (FWS) on October 24, 2012 (see Administrative Record). In her comments, Ms. Schuette recommended timing limitations on all activities at the following well pads: Mojave Fed 4377-6-44, Mojave Fed 4377-27-34, Mojave Fed 4277-11-31, and Mojave Fed 4277-26-41. The BLM biologist recommends that all activities associated with construction, drilling, and completion of wells within 0.5 miles of active raptor nests occur outside of the nesting season (February 1 – July 31) in order to protect against violations of the MBTA.

4.6.2.1.2. Cumulative Effects

The cumulative effects associated with this alternative are within the analysis parameters and impacts described in the PRB FEIS. Refer to the PRB FEIS for details on expected cumulative impacts (p. 4-221).

4.6.2.1.3. Mitigation Measures

To reduce the risk of decreased productivity or nest failure, the BLM BFO recommends a 0.5-mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation be located to provide an adequate biologic buffer for nesting raptors. The BLM conditions all surface disturbing activities associated with implementation of the project, occur outside the breeding and nesting season for raptors where nests have been identified within 0.5 miles of the proposed disturbance. BLM recommends the following well pads and associated infrastructure have timing limitations applied: Mojave Fed 4377-6-44, Mojave Fed 4377-9-11, Mojave Fed 4377-27-34, Mojave Fed 4277-11-31, and Mojave Fed 4277-26-41.

4.6.2.1.4. Residual Effects

Timing limitations from the 2003 FEIS only apply to surface disturbing activities, and will not adequately protect nesting/breeding raptors during completion activities (fracturing, removal of equipment, etc.) which may take weeks to complete, unlike what was written in the 2003 FEIS, p. 4-218, under Harassment and Displacement: "Timing stipulations would not allow new disturbance during the breeding season within species-specific distances of active nests."

Even with timing restrictions, raptors may abandon nests due to foraging habitat alteration associated with development or sensitivity to well or infrastructure placement. All raptors using nests in the vicinity of the project will likely be impacted to some extent by the human disturbance associated with operation and

maintenance of the project. Routine human activities near these nests can draw increased predator activity to the area and increase nest predation. Declines in breeding populations of some species that are more sensitive to human activities may occur. A condition of approval limiting disruptive activities will not be applied to well pads listed under mitigation measures. The impacts described under Direct and Indirect Effects will still occur. Disruptive activities (SUPO, page 7and 10) occurring during the nesting season at the Mojave Fed 4277-11-31, 4277-26-41, and 4377-6-44 well pads could result in a "take" as defined by the MBTA.

4.6.2.2. Migratory Birds

4.6.2.2.1. Direct and Indirect Effects

The PRB FEIS discussed direct and indirect effects to migratory birds on pp. 4-231 to 4-235. The PRB FEIS states on p. 4-231, "Surface disturbance associated with construction, operation, and abandonment of facilities, including roads, has the potential to result in direct mortality of migratory birds. Most birds would be able to avoid construction equipment; however, nests in locations subject to disturbance would be lost, as would any eggs or nestlings." Direct mortality of a bird or destruction of an active nest due to construction activities would result in a "take" as defined (and prohibited) by the MBTA, a nondiscretionary statute, and in turn a violation of the law. See also, FLPMA, Sec. 302(b) and Raptors – Direct and Indirect Effects (4.6.2.1.1).

Habitat disturbance and disruptive activities (i.e. drilling, construction, completion, operations, and maintenance) resulting from implementation of the Sahara project is likely to affect migratory birds in the entire area. Native habitats will be lost directly with the construction of well pads, access roads, and overhead power lines. Surface disturbing activities that occur in the nesting season may kill migratory birds. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Pad construction, drilling, and to a lesser degree production, will displace edge-sensitive migratory birds from otherwise suitable habitat adjacent to the well pad. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003). Habitat fragmentation will result in more than just a quantitative loss in the total area of habitat available; the remaining habitat area will also be qualitatively altered (Temple and Wilcox 1986). Ingelfinger and Anderson (2004) identified that the density of breeding Brewer's sparrows declined by 36% and breeding sage sparrows declined by 57% within 100 meters of dirt roads in 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 will be displaced further away from vegetative edges due to increased human activity, causing otherwise suitable habitat to be abandoned. If the interior habitat is at carrying capacity, then birds displaced from the edges will have no place to relocate. One consequence of habitat fragmentation is a geometric increase in the proportion of the remaining habitat that is near edges (Temple 1986). In severely fragmented habitats, all of the remaining habitat may be so close to edges that no interior habitat remains (Temple and Cary 1988). Over time, this leads to a loss of interior habitat species in favor of edge habitat species. Other migratory bird species that use the disturbed areas for nesting may be disrupted by the human activity, and nests may be destroyed by equipment.

During the onsites, the BLM biologist identified suitable nesting habitat present for several BLM sensitive sagebrush obligates. In addition, passerine nests built in sagebrush shrubs were located in proposed disturbance areas of 2 of the pads. Construction of the following well pads and associated infrastructure will remove sagebrush habitat and could result in a "take" (as described above) of BLM sensitive migratory birds: Mojave Fed 4377-17-44, Mojave Fed 4377-28-31, Mojave Fed 4377-20-44, Mojave Fed 4377-27-34, Mojave Fed 4277-11-31, and Mojave Fed 4277-27-31.

Migratory bird species in the PRB nest in the spring and summer and are vulnerable to the same effects as GSG and raptor species. Though no timing restrictions are typically applied specifically to protect migratory bird breeding or nesting, where GSG or raptor nesting timing limitations are applied, nesting migratory birds are also protected. Where these timing limitations are not applied and migratory bird species are nesting, migratory birds remain vulnerable. Surface disturbing activities associated with portions of the Sahara project will have GSG and raptor timing limitations applied, thereby providing protection to migratory birds until June 30. Whether migratory birds still receive protection until July 31 is dependent on whether an active raptor nest is located within 0.5 miles of the project area.

Lance proposes using a heater treater in the production phase of the Sahara project. Heater treaters, and similar facilities with vertical open-topped stacks or pipes, can attract birds. Facilities without exclusionary devices pose a mortality risk. Once birds crawl into the stack, escape is difficult and the bird may become trapped (U.S. v. Apollo Energies Inc., 611 F.3d 679 (10th Cir. 2010); see also Colorado Oil and Gas Commission, Migratory Bird Policy, accessed February 13, 2012). To minimize these effects, Lance will equip all open-top pits, tanks, and pipes containing hydrocarbons with nets, screens, or other avian exclusion devices to prevent injury or death to migratory birds (Sahara POD SUPO, p. 11).

4.6.2.2.2. Cumulative Effects

The cumulative effects of this alternative are within the analysis parameters and impacts described in the PRB FEIS. Refer to the PRB FEIS (p. 4-235), for details on expected cumulative impacts.

4.6.2.2.3. Mitigation Measures

GSG and raptor timing limitations on surface disturbing activities will also serve to mitigate impacts to nesting migratory birds. Raptor protections are put in place to avoid potential violations of the MBTA, making the guidance for seasonal timing relevant to the migratory bird issue as well. Specific conservation measures to protect migratory birds are not included in the current land use plan, as updated and amended. Although the PRB FEIS ROD addressed the potential impacts from oil and gas development to migratory birds, it did not specifically identify timing limitations on surface disturbing activities to help mitigate those impacts. The RMP is currently under revision, and a change in management for migratory birds is being considered among the alternatives. Until the revision is complete, the BFO will provide project level site-specific analysis of conservation measures implemented for migratory bird protection, and compliance with the MBTA.

BLM provided some level of protection for migratory bird nesting through timing limitations applied to CBNG plans of development for GSG and raptor nesting. Many CBNG projects (consisting of multiple wells) covered large areas that either encompassed GSG nesting habitat or raptor nests. Timing limitations applied as COAs for those projects were likely to also protect migratory birds during the nesting season by effectively limiting the development in a project area during grouse and raptor breeding seasons. Operators were likely to wait to construct facilities until limitations had been lifted for the entire area, in order to cut down on labor costs and difficulties from completing only small portions of the project at a time. With conventional oil projects, where less wells are proposed and development is more complicated, operators will most likely start construction as soon as possible, which could be during the migratory bird nesting season if the proposed area is not within 2 miles of a GSG lek or no active raptor nests are located. The shift in proposed projects from multi-well CBNG projects to single conventional wells, and in turn reducing secondary protections to migratory birds, constitutes a “change in circumstances” (43 CFR 1610.5-6) that should be addressed at the project level until issues can be resolved in a land use plan.

Nesting in Brewer’s sparrows (a BLM SSS) typically occurs mid-May to mid-July. Some young fledge in late July. Sage thrashers (BLM sensitive species) may lay a second clutch of eggs as late as mid-July. Lark sparrows in northern latitudes lay eggs from early May to mid-July (information on breeding habits

available on the Birds of North America Online website: http://bna.birds.cornell.edu/bna). GSG timing limitations on surface disturbing activities will mitigate impacts to nesting migratory birds from March 15 to June 30. However, several species of birds, listed above, are likely to still have eggs or nestlings into July. BLM biologists have observed active Brewer's sparrow nests containing eggs during the last week of June. Only a percentage of known nests are active any given year, so the protections for migratory birds from June 30 to July 31 will depend on how many raptor and mountain plover nests are active. The least restrictive measures (in this case only applying GSG timing limitations) are inadequate to protect all nesting migratory birds that may inhabit the project area.

To reduce the likelihood of a "take" under the MBTA, the BLM biologist recommends that pad construction (vegetation removal) occur outside of the breeding season for the greatest quantity of BLM sensitive passerines (May 1- July 31) where suitable nesting habitat for sagebrush obligates is present. The timing limitation would apply to all surface disturbing activities, unless a pre-construction clearance survey (within approximately 10 days of construction planned May 1-July 31) is completed. If surveys will be conducted, operator will coordinate with BLM biologists to determine protocol. A minimum the surveys will consists of nest searches in areas where vegetation will be removed or destroyed. The BLM recommends the following well pads and associated infrastructure have timing limitations applied for well pad construction during the nesting season for sagebrush obligate passerines (May 1 to July 31): Mojave Fed 4377-17-44, Mojave Fed 4377-28-31, Mojave Fed 4377-20-44, Mojave Fed 4377-27-34, Mojave Fed 4277-11-31, and Mojave Fed 4277-27-31. Timing limitations for GSG (5 well pads; March 15 to June 30), active raptor nests (5well pads; Feb 1 to July 31), and mountain plover nesting seasons (2 well pads; March 15 to July 31) all begin prior to timing limitations for sagebrush obligates, and thus may provide additional protection where migratory bird nesting periods and habitats overlap. The BLM biologist located a passerine nest in sagebrush approximately 65 feet north of the Mojave Fed 4377-17-31SH-H well. GSG, raptor, and mountain plover timing limitations were not recommended for this well; therefore, the migratory bird limitations would be the only protection for BLM sensitive passerines. The BLM also recommends that measures are taken to ensure that migratory birds are excluded from all facilities that pose a mortality risk, including, but not limited to, heater treaters, flare stacks, secondary containment, and standing water or chemicals where escape may be difficult or hydrocarbons or toxic substances are present.

4.6.2.2.4. Residual Effects

If timing limitations on vegetation removal, or clearance surveys, are not applied, the BLM would not be in conformance with the MBTA, the BLM-FWS MOU, or BLM IM No. 2013-005. If the timing limitation on construction activities is applied, it is unlikely that active nests will be destroyed, as most nestlings will have fledged by the beginning of August. Nests initiated after the first week in July may be destroyed by construction after August 1st. Migratory birds nesting adjacent to the well pad or road may be disturbed by construction and production activities. A timing limitation does nothing to mitigate loss and fragmentation of habitat. Suitability of the project area for migratory birds will be negatively affected due to habitat loss and fragmentation and proximity of human activities associated with oil and gas development.

4.6.3. Threatened, Endangered, Candidate, Special Status (Sensitive) Species

Based on the last species list for the BFO from FWS, July 22, 2011, the Ute Ladies'-tresses Orchid is the only ESA-listed species requiring an effects determination (ESA Section 7 (2)). Suitable habitat is not present in the project area and implementation of the proposed project will have no effect on ULT.

4.6.4. Candidate Species

4.6.4.1. Greater Sage-Grouse (GSG)

4.6.4.1.1. Direct and Indirect Effects

The PRB FEIS discussed direct and indirect impacts to GSG, pp. 4-257 to 4-273. Additionally, the 12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered (FWS 2010) and chapters 15-21 of Greater Sage-Grouse: Ecology and Conservation of a Landscape Species and its Habitats (Knick and Connelly 2011) both discuss impacts to GSG associated with energy development in detail. The GSG is a candidate species for federal protection under the ESA. Research shows that declines in lek attendance correlate with oil and gas development. Effects to GSG populations generally result from the loss and fragmentation of sagebrush habitats associated with the construction of well pads, roads, and other facilities. Both males and hens typically avoid nesting and inhabiting in or adjacent to developed areas. Additionally, noise can affect GSG by preventing vocalizations that influence reproduction and other behaviors (BLM 2008). In a study of GSG 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.

Several other studies support well density and proximity to GSG leks as useful metrics for evaluating impacts to GSG, as measured by declines in lek attendance (Braun et al. 2002; Holloran 2005; and Walker et al. 2007). The State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (2008) determined that oil or gas development exceeding approximately 1 well pad per square mile resulted in calculable impacts on breeding populations, as measured by the number of male GSG attending leks (State Wildlife Agencies' Ad Hoc Committee 2008), and recommended that impacts be considered for leks within 4 miles of oil and gas developments. The 2012 Viability Analyses for Conservation of Sage-Grouse Populations prepared for the BLM BFO indicated that effects from energy development, as measured by male lek attendance, are discernible out to a distance of 12.4 miles (Taylor et al. 2012).

The Sahara project area contains suitable nesting, brood-rearing, and winter habitat. Construction of the wells, access roads, and overhead power lines will cause fragmentation of sagebrush stands and result in the direct loss of approximately 80 acres of GSG habitat. Noise and human disturbance associated with roads, construction, drilling, and completion will be disruptive to GSG. Lance describes activities that will occur during completion of proposed wells in its Surface Use Plan of Operations (SUPO) for the Sahara POD. Lance estimates that approximately 90,000 barrels of water will be required to complete each well, resulting in 700 round-trips by tanker trucks to fill holding tanks (SUPO, Water Usage, page 7). Water will be held in 120 to 170 holding tanks on the well pad, or in a large capacity tank in addition to 30 tanks. In addition, Lance estimates that 22,500 to 37,500 bbls of load recovery will be hauled off location to a permitted disposal facility, resulting in additional heavy truck traffic. Completion, including staging and stimulation activities, can last from 3 to 10 days for a typical well, and human activity and heavy truck traffic will occur 24 hours per day during that period (SUPO, Pad Size, page 10). By Lance's estimates of time and number of trucks that will be accessing the well pads during completion, tanker trucks could be arriving at the pad several times per hour. Implementation of the project will adversely impact nesting habitat, both through direct loss and avoidance of the area by GSG due to fragmentation and anthropogenic activity during the production phase. The following well pads and associated infrastructure are proposed in suitable GSG nesting habitat within 2 miles of occupied GSG leks, and will be impacted by surface disturbing and disruptive activities: Mojave Fed 4377-28-31, Mojave Fed 4377-20-44, Mojave Fed 4377-27-34, Mojave Fed 4277-11-31, and Mojave Fed 4277-27-31. A portion of the existing access road to the Mojave Fed 4377-27-34 pad occurs within 0.25 miles CSU of the Bushwacker Creek IV lek. This portion is proposed to have moderate to major upgrades. The BLM biologist performed a viewshed analysis on the lek and determined that a typical haul truck is not likely to be visible to GSG using the lek within 0.25 miles of the lek. This should reduce impacts to the lek from

operation and maintenance activities; however, GSG using the lek and surrounding nesting habitat will still be susceptible to impacts from noise associated with surface disturbing and disruptive activities associated with upgrades, maintenance, and use of the road. Trucks may be visible on the road within 0.5 miles of the lek. Noise from the road may disrupt breeding behavior of GSG using the lek by interfering with the ability to hear vocalizations, increasing stress to individuals, and causing changes in strutting patterns and avoidance of the lek (Patricelli et al. 2012, Blickley et al. 2012, Blickley and Patricelli 2012).

Studies have shown that intermittent noise (such as that associated with traffic) can have a greater impact on GSG than continuous drilling noise, and cause immediate reduction in attendance at leks (Blickley et al. 2012). Light vehicular traffic (1–12 vehicles per day) has been shown to substantially reduce nest initiation rates and increase the distance of nests from lek sites (Lyon and Anderson 2003). Holloran (2005) found that traffic on roads within 0.8 miles of the lek during the early morning while males are strutting is related to declines in male attendance. Due to the increased noise levels, GSG may avoid the Bushwacker Creek IV lek and surrounding nesting habitat, and eventually abandon the area.

The BLM biologist recommends that surface disturbing and disruptive activities occur outside of the breeding/nesting season (March 15 – June 30) within 2 miles of all occupied leks. It is BLM WY policy to manage GSG habitats consistent with the provisions set by the State of Wyoming, and as described in Instruction Memorandum (IM) No. WY-2012-019, *Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands Including the Federal Mineral Estate*. IM 2012-019 states that for areas outside of core and connectivity habitats, "Surface disturbing and/or disruptive activities are prohibited from March 15–June 30 to protect sage-grouse nesting and early brood rearing habitats within 2 miles of the lek or lek perimeter of any occupied lek located outside core or connectivity areas." Allowing disruptive activities (such as those associated with well completion) to occur during the breeding/nesting season (March 15 – June 30) does not support the WY BLM policy. The WGFD recommends a timing limitation on surface disturbing and disruptive activities within 2 miles of occupied leks in order to be in compliance with the State of Wyoming's Greater Sage-Grouse conservation strategy (Executive Order (EO) 2011-5 Greater Sage-grouse Core Area Protection). The intent of EO 2011-5 management in non-core areas is to maintain populations and habitats where possible.

The proposal incorporates design features minimizing effects to GSG populations. Lance reduced surface disturbance through the use of existing roads and will manage produced water to prevent the spread of mosquitoes with the potential to vector West Nile virus in GSG habitat areas. Research has identified reductions in road and well pad construction, vehicle traffic, and industrial noise (Lyon and Anderson 2003; Holloran 2005) and the management of produced water to prevent the spread of mosquitoes with the potential to vector West Nile virus in GSG habitat (Walker et al. 2007) as effective strategies to reduce impacts on GSG. All perimeter or reclamation fences constructed to exclude people, livestock, and wildlife from fluid mineral production and reclamation activities present a collision hazard to GSG, particularly if located near leks or other high risk areas. Therefore, Lance will install fence markers on all wire fences constructed within 1.25 miles of GSG leks to reduce the chances of collision, in accordance with BLM IM 2013-033. Fences constructed on the Mojave Fed 4377-27-34 will be within 1.25 miles of the Bushwacker Creek IV lek.

4.6.4.1.2. Cumulative Effects

Recent research suggests that the cumulative and synergistic effects of current and foreseeable CBNG and conventional oil and gas development in the vicinity of the project area are likely to impact the local GSG population, cause declines in lek attendance, and may result in local extirpation. The GSG population in northeast Wyoming is exhibiting a steady long term downward trend, as measured by lek attendance (WGFD 2010b). Research suggests that these declines may be a result, in part, of CBNG and conventional oil and gas development, as discussed in detail in FWS 2010.

BLM's cumulative impact assessment for GSG includes an area that encompassed a 4-mile radius around the 15 GSG leks occurring within 4 miles of the project area boundary. All 12 well pads are within 4 miles of at least one occupied GSG lek. 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 (State Wildlife Agencies' Ad Hoc Committee 2008). In accordance with the findings of the 2012 *Viability Analyses For Conservation Of Sage-Grouse Populations*, which indicated that declines in male lek attendance due to energy development are discernible to a distance of 12.4 miles (Taylor et al. 2012), further analysis revealed 48 leks within a 12.4-mile buffer of the project area, 3 of which are located in GSG core habitat. The proposed well pads would increase the density of disturbance within 4- and 12.4-mile buffers of most leks within 4 miles of the project area boundary (Table 4.1). Despite the increased well density, the WGFD category of impact is likely to remain the same for all leks with the exception of Garrett, a core habitat lek, whose category of impact would change from low to moderate.

Table 4.1. Active GSG Leks within 4 miles of Proposed Well Pads

Lek Name[1]	In Core Area? (Y or N)	Density of Permitted Producing Wells (wells per square mile)[2]		WGFD Category of Impact[3]
		4-mile buffer	*12.4-mile buffer*	
37-Rhodes	N	3.1	2.9	extreme
38-Beecher Draw	N	8.5	4.9	extreme
38-Beecher Draw N	N	8.9	5.1	extreme
38-Bushwacker Creek IV	N	8.0	3.9	extreme
38-Bushwacker Creek V	N	7.0	3.6	extreme
38-Bushwhacker Creek I	N	8.4	4.1	extreme
38-Bushwhacker Creek II	N	6.8	3.5	extreme
38-Bushwhacker Creek III	N	4.0	2.9	extreme
38-Cedar Canyon	N	4.7	4.4	extreme
38-Cottonwood Creek 1	N	6.7	5.2	extreme
38-East Holler	N	2.9	3.4	high
38-Garrett	Y	1.0	3.0	moderate[4]
38-Garrett 2	Y	2.1	3.3	high
38-Mengel	N	6.5	4.1	extreme
38-Rhodes 2	N	4.0	3.0	extreme

[1] BLM 2012
[2] The locations of permitted and producing oil and gas wells were obtained from the WOGCC online database (WOGCC 2012).
[3] Calculated based on wells within a 4-mile buffer of leks.
[4] Category of impact changed from low to moderate.

The building of wells and infrastructure, noise, and other project-related impacts associated with the proposed action are likely to contribute to GSG population decline through the direct and indirect effects described above; however, BLM anticipates the cumulative impacts from the proposed action to be minor relative to the high level of existing development in the area. Although the well density does not appreciably increase with the development of the proposed wells, the amount of traffic for production and product transport, as well as human activity associated with production, is anticipated to increase. Refer to the PRB FEIS, pp. 4-271 to 4-273; the 2010 FWS listing decision; and (Taylor et al. 2012) for additional information on cumulative impacts to GSG from oil and gas development.

4.6.4.1.3. Mitigation Measures

The BLM BFO recommends that all surface disturbing activities occur outside the breeding/nesting season where these activities are proposed within 2 miles of GSG leks. To protect nesting and brood rearing GSG, BLM will implement a timing limitation (March 15 to June 30) on surface-disturbing activities at the following well pads: Mojave Fed 4377-28-31, Mojave Fed 4377-20-44, Mojave Fed 4377-27-34, Mojave Fed 4277-11-31, and Mojave Fed 4277-27-31. The intent of this timing restriction is

to decrease the likelihood that GSG will avoid these areas and increase habitat quality by reducing noise and human activities during the breeding season.

4.6.4.1.4. Residual Effects

A timing limitation does not mitigate loss and fragmentation of habitat or changes in disease mechanisms. Timing limitations for disruptive activities (i.e. completion activities) will not be applied (as a condition of approval) during the breeding/nesting season at the well pads listed under Mitigation Measures. Allowing disruptive activities (such as those associated with well completion) to occur during the breeding/nesting season (March 15 – June 30) does not support the WY BLM IM WY-2012-019. If completion activities (SUPO pages 7 and 10) occur during the breeding/nesting season, then the impacts described under Direct and Indirect Effects of this section will still occur. Timing limitations will not apply to activities occurring off-lease, including surface disturbance associated with upgrades to existing roads within 2 miles of occupied leks, and impacts associated with these activities may impact GSG using the area. In general, the suitability of the project area for GSG will be negatively affected due to habitat loss and fragmentation and proximity of human activities associated with fluid mineral development.

4.7. Special Status (Sensitive) Species (SSS)

BLM analyzed site-specific effects to sensitive species below in Sections 4.7.1 (black-tailed prairie dog), 4.7.2 (bald eagle), 4.7.3 (ferruginous hawk), 4.7.4 (western burrowing owl), 4.7.5 (loggerhead shrike), 4.7.6 (mountain plover), 4.7.7 (sage thrasher), 4.7.8 (Brewer's sparrow), 4.7.9 (Baird's sparrow).

4.7.1. Black-tailed Prairie Dog

The PRB FEIS discussed the direct, indirect and cumulative impacts to black-tailed prairie dogs, pp. 4-255 to 4-256. The proposal could result in the direct injury or mortality of black-tailed prairie dogs, as well as indirect effects from use of new project facilities as raptor perches, habitat loss and fragmentation, and the reduced availability of suitable habitats. In addition to the direct and indirect effects described above, black-tailed prairie dogs are often poisoned on private lands in northeast Wyoming. Since the BLM does not poison prairie dogs, BLM lands, along with FS National Grasslands, have become essential to the species. The BLM proposes no additional mitigation beyond Lance's applicant committed measures. No residual effects are anticipated.

4.7.2. Bald Eagle

The PRB FEIS discussed the direct, indirect, and cumulative impacts, pp. 4-251 to 4-253. The project may flush or displace foraging eagles and remove or decrease the value of potential roosting areas. This level of disruption is not anticipated to harm individuals. If bald eagles rely on the prairie dog colonies for prey, practices such as poisoning or shooting of prairie dogs or other intentional methods of extermination in order to increase forage for livestock can potentially harm bald eagles through a reduction in their prey base. The BLM proposes no additional mitigation beyond Lance's applicant committed measures. BLM anticipates no residual effects.

4.7.3. Ferruginous Hawk

BLM anticipates no direct or indirect effects. Three ground nests suspected to have been built by ferruginous hawks within 0.5 miles of the proposed Mojave Fed 4277-27-31 well pad were inactive in 2012 and are out of line of sight of the well pad and access road. Birds may avoid the area due to noise from drilling activities. Project activities may remove or decrease the value of potential foraging areas. The cumulative effects associated with this alternative are within the analysis parameters and impacts described in the PRB FEIS, pp. 4-262 and 4-273. The BLM proposes no mitigation beyond Lance's applicant committed measures. No residual effects are anticipated.

4.7.4. Western Burrowing Owl

The PRB FEIS discussed the direct, indirect, and cumulative impacts to the western burrowing owl on p. 4-263. Noise and disturbances associated with project activities at the Mojave Fed 4377-6-44 pad, Mojave Fed 4377-9-11 pad, road upgrades in the west half of Section 17 (T44N, R77W), and road upgrades in Sections 14 and 15 (T42N, R77W) may result in the disturbance or abandonment of a burrowing owl nest site and suitable nesting habitat in the project area. Both raptor and plover timing limitations will be implemented for the 2 well pads listed above, which could extend to July 31 if active nests are present, providing some level of protection for nesting burrowing owls. Practices such as poisoning or shooting of prairie dogs or other intentional extermination on fee lands can potentially affect burrowing owl productivity through a reduction in nest site availability. BLM documented burrowing owls nesting throughout the project area. Wells, roads, and overhead power lines that are built in and in close proximity prairie dog colonies will directly impact nesting habitat and may reduce the quality of adjacent habitats for burrowing owls, regardless of the timing of their construction.

4.7.5. Loggerhead Shrike

The PRB FEIS discusses direct, indirect, and cumulative impacts to loggerhead shrike on p. 4-263. Refer to Section 4.6.2.2.1 for a discussion of direct and indirect effects to migratory birds. Refer to Section 4.6.2.2.2 for a discussion of cumulative effects to migratory birds. Refer to Section 4.6.2.2.3 for a discussion of mitigation measures for migratory birds, which include timing limitations for sagebrush obligate species. Refer to Section 4.6.2.2.4 for a discussion of residual effects to migratory birds.

4.7.6. Mountain Plover

4.7.6.1. Direct and Indirect Effects

The PRB FEIS discussed impacts to mountain plover on pp. 4-254 to 4-255, Final Biological Assessment (Appendix J), and Final Biological and Conference Opinion (Appendix K). Noise and disturbances associated with project activities are likely to decrease the likelihood that suitable habitat identified in the project area will be utilized by mountain plover. Development of the Sahara project may impact mountain plovers. Suitable nesting habitat, that has been historically used by mountain plovers, is present within 0.25 miles of the Mojave Fed 4377-6-44 and Mojave Fed 4377-9-11 pads. Surface disturbing and disruptive activities associated with the construction, drilling, completion and production phases of these 2 well pads are likely to impact mountain plover. Flat ridge tops and the black-tailed prairie dog colonies described in section 3.6.5.1 (Black-tailed Prairie Dog) may provide suitable mountain plover habitat in some years, depending on precipitation and grazing pressure. Mineral development has mixed effects on mountain plovers. Disturbed ground, such as buried pipeline corridors and roads, may be attractive to plovers, while human activities within one-quarter mile may be disruptive. Use of roads and pipeline corridors by mountain plovers may increase their vulnerability to vehicle collision. Limiting travel speed to 25mph provides drivers an opportunity to notice and avoid mountain plovers and allows the birds sufficient time to escape from approaching vehicles. Even if a nesting plover flushes in time, the nest would likely still be destroyed. Overhead power lines provide perch sites for raptors that could result in increased mountain plover predation. Infrastructure such as treaters, tanks, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes. Displaced mountain plovers may choose to nest in 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.

4.7.6.2. Cumulative Effects

The PRB FEIS analyzed the cumulative effects to mountain plovers on pp. 4-245 to 4-255.

4.7.6.3. Mitigation Measures

The BLM BFO will recommend a 0.25 mile timing limitation on all surface disturbing and disruptive activities, including completion activities, for potential nesting habitat during the nesting season to reduce impacts to nesting mountain plovers. BLM recommends the following well pads and associated infrastructure have timing limitations applied for well pad construction during the nesting season for mountain plover (March 15 to July 31): Mojave Fed 4377-6-44 and Mojave Fed 4377-9-11. Additional mitigation measures may be applied, as appropriate, from the PRB Final Biological Opinion (Appendix K, pp. 45-47) in order to minimize impacts to nesting plovers.

4.7.6.4. Residual Effects

Surface-disturbing activities may displace mountain plovers, even with timing limitations because of other activities associated with development. Traffic and construction activities that are not prohibited by the timing limitations may degrade habitat quality sufficiently to render the area unsuitable for some mountain plovers. Timing limitations do not reduce impacts to habitat. Drilling and construction outside the nesting season will result in habitat loss for this species. Mortalities associated with maintenance and non-surface-disturbing activities could still occur.

4.7.7. Sage Thrasher

The PRB FEIS discusses direct, indirect, and cumulative impacts to sage thrasher on p. 4-263. Refer to Section 4.6.2.2.1 for a discussion of direct and indirect effects to migratory birds. Refer to Section 4.6.2.2.2 for a discussion of cumulative effects to migratory birds. Refer to Section 4.6.2.2.3 for a discussion of mitigation measures for migratory birds, which include timing limitations for sagebrush obligate species. Refer to Section 4.6.2.2.4 for a discussion of residual effects to migratory birds.

4.7.8. Brewer's Sparrow

The PRB FEIS discusses direct, indirect, and cumulative impacts to Brewer's sparrow on p. 4-264. Refer to Section 4.6.2.2.1 for a discussion of direct and indirect effects to migratory birds. Refer to Section 4.6.2.2.2 for a discussion of cumulative effects to migratory birds. Refer to Section 4.6.2.2.3 for a discussion of mitigation measures for migratory birds, which include timing limitations for sagebrush obligate species. Refer to Section 4.6.2.2.4 for a discussion of residual effects to migratory birds.

4.7.9. Baird's Sparrow

The PRB FEIS discusses direct, indirect, and cumulative impacts to Baird's sparrow on p. 4-264. Refer to Section 4.6.2.2.1 for a discussion of direct and indirect effects to migratory birds. Refer to Section 4.6.2.2.2 for a discussion of cumulative effects to migratory birds. Refer to Section 4.6.2.2.3 for a discussion of mitigation measures for migratory birds, which include timing limitations for sagebrush obligate species. Refer to Section 4.6.2.2.4 for a discussion of residual effects to migratory birds.

4.8. Cultural Resources

4.8.1. Direct and Indirect Effects

Non-eligible sites 48JO4329 and 48JO3325 will be affected by the proposed project. No historic properties will 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 February 7, 2013, that no historic properties exist within the area of potential effect (APE). If any cultural values (e.g., sites, artifacts, human remains [see Appendix L of the PRB FEIS]) are observed during operation of these leases, permits, and ROWs, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the Standard COA (General)(A)(1).

4.8.2. 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 affected 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, 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.

4.8.3. Mitigation Measures

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

4.8.4. Residual Effects

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

5. CONSULTATION/COORDINATION:

BLM Consulted or Coordinated with the Following on this Project (Onsite Presence – OSP)

Contact	Organization	OSP?	Contact	Organization	OSP?
Eric Holborn	BLM	Yes	Bo Winter	Lance O&G	Yes
Darci Stafford	BLM	Yes	Craig Klaahsen	Lance O&G	Yes
Dee Johnson	Landowner Rep	Yes	Clint Beaver	Lance O&G	Yes
Tommy Moore	Landowner Rep	Yes	Ted Huss	Lance O&G	Yes
Michelle Nordwald	Lance O&G	Yes	Andy Sutphin	Big Horn Environmental	Yes
Tami Brantz	Lance O&G	Yes	Greg Hoechst	609 Consulting	Yes
Colleen Faber	Lance O&G	Yes	Nathan Wagoner	ICF International	Yes
Callie Brehm	Lance O&G	Yes	Mary Hopkins	WY State Historic Preservation Office	No

List of Preparers (BFO unless otherwise noted)

Position/Organization	Name	Position/Organization	Name
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Supervisory NRS	Casey Freise	Wildlife Biologist	Darci Stafford
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Position/Organization	Name	Position/Organization	Name
Soils	Arnie Irwin	Supervisory NRS	Bill Ostheimer
Hydrologist	Kathy Brus	Assistant Field Manager	Chris Durham
Assistant Field Manager	Clark Bennett	NEPA Coordinator	John Kelley
Realty Specialist	Amber Haverlock		

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Appendix A. Affected Resources Worksheet

Resource	Resource Present	Resource Affected	PRB FEIS Sufficient	Notes
Air quality	Yes	Yes	No	Analyze in EA.
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 to 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	Yes	No	
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: not applicable	NA	NA	
Proposed range improvements	NA	NA	NA	
Realty	No	No	Yes	
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	No	No	NA	
Social & Economic	Yes	Yes	Yes	See PRB FEIS 3-275-3-289, 4-336-4-370.
Transportation	Yes	Yes	Yes	
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	

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	NA	NA	DOI Order 3310.
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	NA	NA	
Class III	Yes	Yes	Yes	See PRB FEIS, pages 3-252-3-263, 4-302-4-3-252-3-263, 4-302-4.
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 pp. 7 & 8 (App. D), (pp. 3-1 to 56).
Wildland Urban Interface	No	NA	NA	
Wildlife	Yes	Yes	No	
ESA listed, proposed, or candidate species	Yes	Yes	No	Analyze in EA. Greater Sage-Grouse (GSG) 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.
General wildlife	Yes	Yes	No	Analyze in EA
West Nile virus	Yes	Yes	Yes	

Appendix B. Raptor Nests within 0.5-Mile of Proposed Well Pads (Source: REF 0025)

Nest ID #	Species	Nest Status	Nest Condition	Nest Substrate	*Qtr*	*Sec*	*Twp*	*Rng*
A15-07	N/A	INAC	NEST GONE	CTL	SE ¼ SE ¼	6	43N	77W
1959	UNRA	INAC	UNKNOWN	CTD	SW ¼ SW ¼	27	43N	77W
1961	UNRA	INAC	POOR	GHS	NE ¼ SW ¼	22	42N	77W
1962	UNRA	INAC	POOR	GHS	SE ¼ SW ¼	22	42N	77W
1963	UNRA	INAC	POOR	GHS	NE ¼ SW ¼	22	42N	77W
1964	UNRA	INAC	REMNANTS	GHS	SE ¼ SW ¼	22	42N	77W
1965	UNRA	INAC	REMNANTS	GHS	SE ¼ SW ¼	22	42N	77W
1966	N/A	INAC	NEST GONE	GHS	NE ¼ SW ¼	22	42N	77W
1975	N/A	DNLO	UNKNOWN	CTL	SW ¼ SE ¼	2	42N	77W
1976	RTHA	ACTI	GOOD	CTL	SW ¼ NE ¼	11	42N	77W
1977	N/A	INAC	N/A	CTL	SE ¼ SE ¼	23	42N	77W
1978	RTHA	ACTI	GOOD	CTL	SE ¼ SE ¼	2	42N	77W
1979	UNRA	INAC	FAIR	CTL	SE ¼ SE ¼	2	42N	77W
2835	UNRA	INAC	REMNANTS	CTL	SE ¼ NW ¼	9	43N	77W
2836	N/A	INAC	NEST GONE	CTL	SE ¼ NW ¼	9	43N	77W
2838	N/A	INAC	NEST GONE	CTL	SE ¼ SE ¼	17	43N	77W
2857	N/A	DNLO	UNKNOWN	CTL	NE ¼ SW ¼	17	43N	77W
2897	N/A	INAC	N/A	CTL	SW ¼ NE ¼	9	43N	77W
4723	N/A	INAC	NEST GONE	CTL	SE ¼ SE ¼	2	42N	77W
4734	N/A	INAC	NEST GONE	CTL	NE ¼ SW ¼	24	42N	77W
4736	N/A	INAC	SUB GONE	CTL	NE ¼ SW ¼	22	42N	77W
4737	N/A	INAC	SUB GONE	CTL	SE ¼ SW ¼	22	42N	77W
4738	N/A	INAC	N/A	CTD	SW ¼ SE ¼	23	42N	77W
4739	N/A	INAC	NEST GONE	CTL	SW ¼ NE ¼	26	42N	77W
4742	N/A	INAC	NEST GONE	CTL	NW ¼ NE ¼	26	42N	77W
4897	BBMA	INAC	POOR	WIL	NE ¼ NE ¼	14	42N	77W
5640	N/A	INAC	NEST GONE	CTL	SE ¼ SW ¼	17	43N	77W
5641	N/A	INAC	NEST GONE	CTL	SE ¼ SW ¼	17	43N	77W
5657	UNRA	INAC	POOR	CTD	SW ¼ SW ¼	27	43N	77W
5663	N/A	INAC	NEST GONE	CTL	NE ¼ NE ¼	26	42N	77W
5664	RTHA	ACTI	GOOD	CTL	SE ¼ SE ¼	23	42N	77W
5665	N/A	INAC	NEST GONE	CTL	SE ¼ SE ¼	2	42N	77W
10666	UNOW	ACTI	GOOD	CTL	NW ¼ NW ¼	35	43N	77W
10672	GOEA	ACTF	FAIR	CTL	SE ¼ NW ¼	34	43N	77W
11298	UNRA	INAC	FAIR	CTL	SE ¼ SE ¼	2	42N	77W
11308	UNRA	INAC	POOR	CTL	SW ¼ NE ¼	7	43N	77W
11372	BUOW	ACTI	UNKNOWN	ACB	NW ¼ NW ¼	7	43N	77W
12230	N/A	DNLO	UNKNOWN	WIL	SW ¼ SW ¼	26	43N	77W
12237	UNRA	INAC	GOOD	WIL	NE ¼ SE ¼	27	43N	77W

ACB: active burrow	CTD: Cottonwood Tree (dead)	INAC: inactive	SE : southeast
ACTF: active failed to fledge	CTL: Cottonwood Tree (live)	N/A: not applicable	SW: southwest
ACTI: active	DNLO: did not locate	NE: northeast	UNOW: unknown owl
BBMA: Black-billed Magpie	GHS: ground/hillside	NW: northwest	UNRA: unknown raptor
BUOW: Burrowing Owl	GOEA: Golden Eagle	RTHA: Red-tailed Hawk	WIL: willow (live)

Appendix C. Existing Category of Impact for Greater Sage-Grouse Leks within 12.4 miles of the Project Area

Lek Name[1]	In Core? (Y or N)	Within 4-miles of Project Area? (Y or N)	Number of Permitted and Producing Wells[2]		Density of Permitted Producing Wells (wells per square mile)		WGFD Category of Impact[3]
			4-mile buffer	*12.4-mile buffer*	*4-mile buffer*	*12.4-mile buffer*	
35-Mai Tai	N	N	120	989	2.4	2.0	high
37-Larry Smith	N	N	11	2,865	0.2	5.9	low
37-Rhodes	N	Y	154	1,416	3.1	2.9	extreme
37-Salt Creek	N	N	8	2,857	0.2	5.9	low
37-Search	N	N	130	2,847	2.6	5.9	high
38-Beecher Draw	N	Y	421	2,341	8.4	4.8	extreme
38-Beecher Draw N	N	Y	442	2,440	8.8	5.1	extreme
38-Brown Ranch	N	N	217	2,695	4.3	5.6	extreme
38-Bushwacker Creek IV	N	Y	400	1,895	8.0	3.9	extreme
38-Bushwacker Creek V	N	Y	348	1,740	6.9	3.6	extreme
38-Bushwhacker Creek I	N	Y	417	1,995	8.3	4.1	extreme
38-Bushwhacker Creek II	N	Y	337	1,692	6.7	3.5	extreme
38-Bushwhacker Creek III	N	Y	196	1,410	3.9	2.9	extreme
38-Cedar Canyon	N	Y	230	2,130	4.6	4.4	extreme
38-Christensen Ranch 1	N	N	365	3,025	7.3	6.3	extreme
38-Christensen Ranch 2	N	N	405	2,955	8.1	6.1	extreme
38-Christensen Ranch 3	N	N	368	3,009	7.3	6.2	extreme
38-Christensen Ranch 4	N	N	416	3,186	8.3	6.6	extreme
38-Christensen Ranch 5	N	N	317	3,214	6.3	6.7	extreme
38-Christensen Ranch 7	N	N	437	2,790	8.7	5.8	extreme
38-Collins	N	N	218	2,186	4.3	4.5	extreme
38-Collins North	N	N	216	2,382	4.3	4.9	extreme
38-Collins SW	N	N	181	2,051	3.6	4.2	extreme
38-Cottonwood Creek 1	N	Y	334	2,529	6.6	5.2	extreme
38-Cottonwood Creek 2	N	N	326	3,038	6.5	6.3	extreme
38-Cottonwood Creek 3	N	N	281	2,535	5.6	5.2	extreme
38-Dry Willow	N	N	278	3,347	5.5	6.9	extreme
38-East Holler	N	Y	140	1,642	2.8	3.4	high
38-Garrett	Y	Y	47	1,455	0.9	3.0	low
38-Garrett 2	Y	Y	101	1,595	2.0	3.3	high
38-Gilbertz III	N	N	459	3,734	9.1	7.7	extreme
38-Hines	N	N	168	3,367	3.3	7.0	extreme
38-Hines NW	N	N	193	3,454	3.8	7.2	extreme

Lek Name[1]	In Core? (Y or N)	Within 4-miles of Project Area? (Y	Number of Permitted and Producing Wells[2]		Density of Permitted Producing Wells (wells per square mile)		WGFD Category of
38-Irigaray	N	N	323	2,493	6.4	5.2	extreme
38-Irigaray II	N	N	356	2,587	7.1	5.4	extreme
38-Little Black Butte	N	N	234	2,969	4.7	6.1	extreme
38-Mengel	N	Y	325	1,991	6.5	4.1	extreme
38-Mud Spring Creek	N	N	406	3,629	8.1	7.5	extreme
38-North Butte	N	N	426	3,674	8.5	7.6	extreme
38-Pumpkin	N	N	178	3,202	3.5	6.6	extreme
38-Reno Draw	Y	N	8	1,184	0.2	2.5	low
38-Rhodes 2	N	Y	195	1,450	3.9	3.0	extreme
38-South Butte	N	N	175	3,290	3.5	6.8	extreme
38-T-Chair	N	N	208	2,351	4.1	4.9	extreme
38-Willow Creek	N	N	462	3,616	9.2	7.5	extreme
38-Windmill	N	N	294	3,363	5.8	7.0	extreme
38-Windmill North	N	N	274	3,454	5.5	7.2	extreme
38-Windmill NW	N	N	301	3,336	6.0	6.9	extreme

[1] REF 0027

[2] The locations of permitted and producing oil and gas wells were obtained from the WOGCC online database (REF 0006).

[3] Calculated based on wells within a 4-mile buffer of leks.

Appendix D. Summary of Special Status (Sensitive) Species Habitat and Project Effects Associated with the Sahara POD.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Amphibians				
Northern leopard frog (*Rana pipiens*)	Beaver ponds and cattail marshes from plains to montane zones.	S	MIIH	Reservoirs & ponds may be used. Project noise may impact ability to hear vocalizations within the population.
Columbia spotted frog (*Ranus pretiosa*)	Wet, moist zones in South Tongue River headwaters & tributaries.	NP	NI	The project area is outside the species range and the species is not expected to occur.
Fish				
Yellowstone cutthroat trout (*Oncoryhynchus clarki bouvieri*)	Cold-water rivers, creeks, beaver ponds, & lakes in the Upper Tongue sub-watershed.	NP	NI	The project area is outside the species' range, and the species is not expected to occur.
Birds				
Baird's sparrow (*Ammodramus bairdii*)	Shortgrass & basin-prairie shrublands; plowed & stubble fields; grazed pastures; dry lakebeds; & sparse, bare, dry ground.	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
Bald eagle (*Haliaeetus leucocephalus*)	Mature forest cover often within one mile of large water body with reliable prey source nearby.	K	MIIH	Bald eagles are unlikely to use the few mature trees in the area for nesting or winter roosting. Surface disturbing & maintenance activities may impact foraging eagles; they may avoid the area.
Brewer's sparrow (*Spizella breweri*)	Sagebrush shrubland.	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
Ferruginous hawk (*Buteo regalis*)	Basin-prairie shrub, grasslands, rock outcrops.	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
Loggerhead shrike (*Lanius ludovicianus*)	Basin-prairie shrub, mountain-foothill shrub.	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
Long-billed curlew (*Numenius americanus*)	Grasslands, plains, foothills, wet meadows	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
Mountain Plover	Short-grass prairie with slopes less than 5%.	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
Northern goshawk (*Accipiter gentilis*)	Conifer and deciduous forests.	NP	NI	Habitat not present.
Peregrine falcon (*Falco peregrinus*)	Cliffs.	NP	NI	Habitat not present.
Sage sparrow (*Amphispiza billneata*)	Basin-prairie shrub, mountain-foothill shrub.	NS	NI	Species not known from this area.
Sage thrasher (*Oreoscoptes montanus*)	Basin-prairie shrub, mountain-foothill shrub.	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
Trumpeter swan (*Cygnus buccinator*)	Lakes, ponds, rivers.	NP	NI	Habitat not present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Western Burrowing owl (*Athene cunicularia*)	Grasslands, basin-prairie shrub.	K	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area.
White-faced ibis (*Plegadis chihi*)	Marshes, wet meadows.	NP	NI	Habitat not present.
Yellow-billed cuckoo (*Coccyzus americanus*)	Open woodlands, streamside willow and alder groves.	NP	NI	Habitat not present.
Mammals				
Black-tailed prairie dog (*Cynomys ludovicianus*)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	MIIH	Prairie dog towns may be impacted by dust, noise, human activities, and direct loss.
Fringed myotis (*Myotis thysanodes*)	Conifer forests, woodland chaparral, caves and mines.	NP	NI	Habitat not present.
Long-eared myotis (*Myotis evotis*)	Conifer and deciduous forest, caves and mines.	NP	NI	Habitat not present.
Swift fox (*Vulpes velox*)	Grasslands.	K	MIIH	Nesting and denning habitat may be impacted by dust, noise, human activities, and direct loss. Foxes may be killed on project roads. Species may avoid area.
Townsend's big-eared bat (*Corynorhinus townsendii*)	Caves and mines.	NP	NI	Habitat not present.
Plants				
Limber Pine (*Pinus flexilis*)	Mountains, associated with high elevation conifer species.	NP	NI	Habitat not present.
Porter's sagebrush (*Artemisia porteri*)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5,300-6,500 feet.	NP	NI	Habitat not present.
William's wafer parsnip (*Cymopterus williamsii*)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6,000-8,300 feet.	NP	NI	Project area outside of species' range.

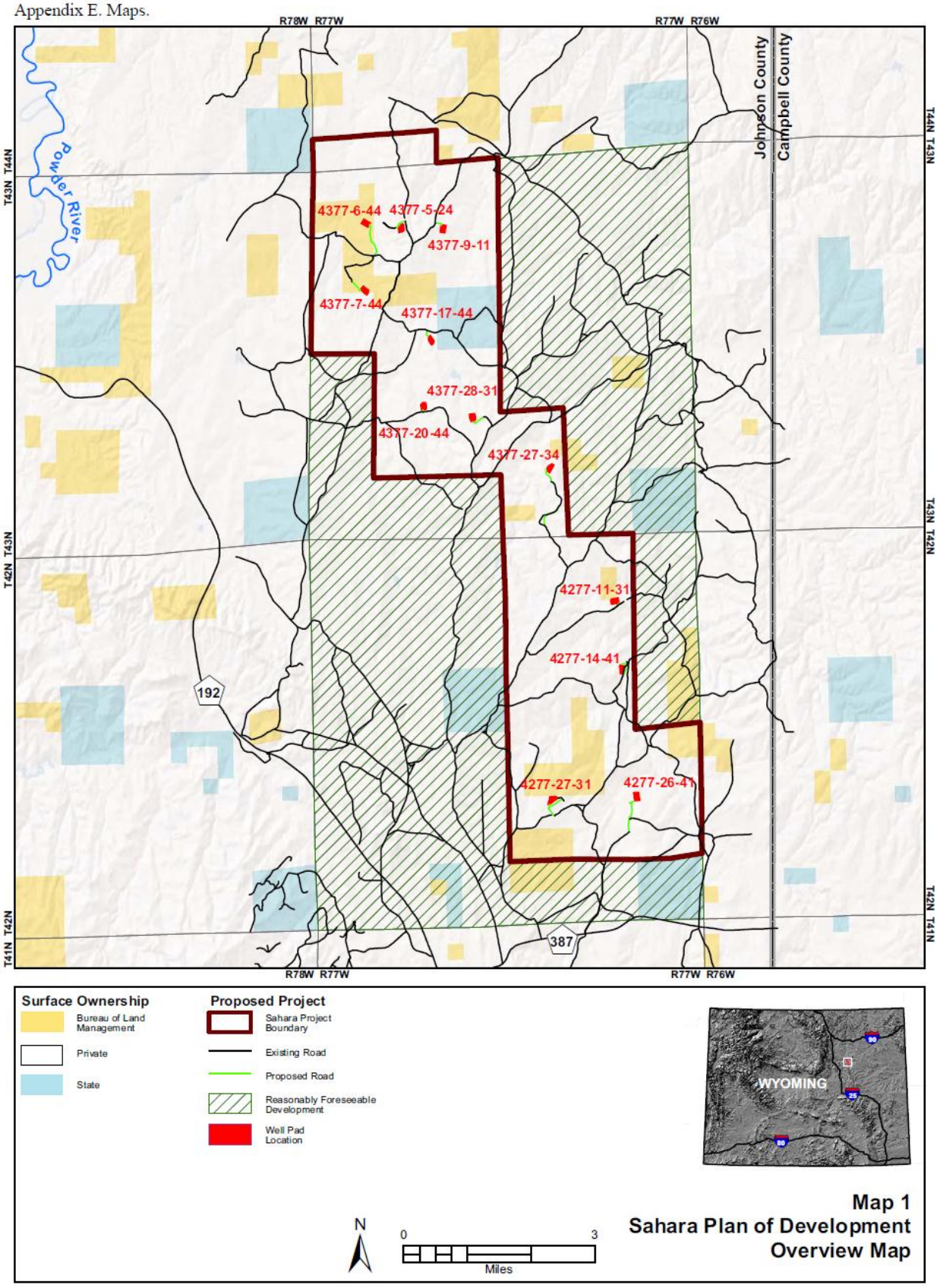
Presence

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

Project Effects

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

Appendix E. Maps.



Map 1
Sahara Plan of Development
Overview Map