DECISION RECORD
Environmental Assessment (EA), WY-070-EA13-13
EOG Resources, Inc., Longbow Multi-Well Pad Project
Bureau of Land Management, Buffalo Field Office, Wyoming

DECISION. The BLM approves EOG Resources Inc. (EOG) Longbow Multi-Well Pad Project as described in Alternative B of the environmental assessment (EA) WY-070-EA13-13. 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); to include 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.

Consultation. This decision considered:

- BLM Washington Office Instruction Memorandum No. 2009-078, Processing Oil and Gas Application for Permit to Drill for Directional Drilling into Federal Mineral Estate from Multiple-Well Pads on Non-Federal Surface and Mineral Locations, 2009.
- Wyoming BLM State Director Review, SDR No. WY-2011-010, EOG Resources, Inc. v. Pinedale Field Office, 2011.

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.

Well Site. BLM approves the following APDs and support facilities:

#	Well Name	Well #	Pad #	Twp	Rng	Sec	Qtr*	Surface Lease	Lateral Lease(s)	BHL Lease
1	LONGBOW	208-28H	52	42N	71W	28	SESW	FEE	WYW89169	FEE
2	LONGBOW	3-2821H								
									WYW129497	
									WYW139065	
3	LONGBOW	203-30H	51	42N	71W	30	SESW	WYW105937	WYW140770	
4	LONGBOW	204-30H							FEE	
5	LONGBOW	5-30H							WYW140770	
6	LONGBOW	6-30H							FEE	
7	LONGBOW	9-30H	255	42N	71W	30	NWNE	WYW105937	WYW140770	
8	LONGBOW	205-30H								
9	LONGBOW	10-32H	261	42N	71W	32	SWSE	WYW55069	WYW55069	
10	LONGBOW	202-32H								
11	LONGBOW	7-32H	49	42N	71W	32	SESW	WYW55069	WYW89169	
12	LONGBOW	200-32H								

*Quarters are for illustration only since lots denote surface boundaries; see APDs in the Administrative Record.

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-EA13-13, and the FONSI (both incorporated here by reference) found EOG's proposal for Longbow Multi-Well Pad Project 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 experience in the PRB (outside of the Fortification Creek Planning Area) revealed little public input or new issue discovery other than those revealed after public scoping during development of the PRB FEIS.

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

1. BLM and EOG 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 Greater Sage-Grouse (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. EOG will conduct operations to minimize adverse effects to surface and subsurface resources, prevent unnecessary surface disturbance, and conform with currently available technology and practice.
3. The selected alternative will help meet the nation's energy needs, and help stimulate local economies by maintaining workforce stability.
4. EOG 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.
5. EOG certified it has a surface access agreement or posted a 43 CFR 3814.1 bond.
6. EOG provided the BLM a true and complete copy of a document in which the owner of the surface authorizes the operator to drill a federal well from non-federal lands, and in which the surface owner or representative guarantees the Department of the Interior (Department), including BLM, access to the non-federal lands to perform all necessary surveys and inspections. (See BLM WO Instruction Memorandum No. 2009-078, p. 2, para 6).
7. The project is clearly lacking in wilderness characteristics as there is no federal surface.

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.

Field Manager: _____ Date: 4/11/13

FINDING OF NO SIGNIFICANT IMPACT
Environmental Assessment (EA), WY-070-EA13-13
EOG Resources, Inc., Longbow Multi-Well Pad Project
Bureau of Land Management, Buffalo Field Office, Wyoming

FINDING OF NO SIGNIFICANT IMPACT (FONSI). Based on the information in the EA, WY-070-EA13-13, 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 there is no federally owned surface. 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.

Field Manager: _____ Date: 4/11/13

ENVIRONMENTAL ASSESSMENT (EA), WY-070-EA13-13
EOG Resources, Inc. Longbow Multi-Well Pad Project, Applications for Permit to Drill (APDs)
Bureau of Land Management, Buffalo Field Office, Wyoming

1. INTRODUCTION

BLM conducts this environmental assessment (EA) in partial response to EOG Resources, Inc. (EOG) Longbow Multi-well Pad Project with 12 oil and natural gas well applications for permit to drill (APD). This site-specific analysis tiers to the information and analysis in the Powder River Basin Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS), WY-070-02-065 (2003), and its Record of Decision (ROD) pursuant to 40 CFR 1508.28 and 1502.21. The PRB FEIS is available for review at the BLM Buffalo Field Office (BFO) and on our website, http://www.blm.gov/wy/st/en/field_offices/Buffalo.html. The APDs are pursuant to the Mineral Leasing Act for the purpose of exploring or developing oil or gas. These proposed APDs exceed the parameters for categorical exclusions under the Energy Policy Act of 2005, Section 390. This EA addresses site-specific resources and potential impacts associated with the Longbow Multi-Well Pads Project that were not specifically addressed in the PRB FEIS. Four proposed pads hosting 10 proposed wells have split jurisdiction (private (fee) surface over federal mineral estate). BLM has lesser jurisdiction on one pad that hosts two proposed wells (fee surface over fee minerals then draining federal minerals).

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. Third, (this phase) is deciding on the proposed plan of development POD or APD, or both: the site-specific analysis, and mitigation. Fourth is the monitoring and reclamation of lands disturbed by the proposed action.

1.1. Background

Surface ownership in the proposal area is private land. The long-term proposal is constructing, drilling, completing, and operating up to 30 exploratory wells from 5 well pads. EOG and BLM held an initial planning meeting on March 15, 2012. EOG filed notices of staking (NOS) in May 2012. BLM and EOG conducted field inspections of the proposed well pads from 21 to 23 May, 2012.

EOG submitted APDs on several dates in 2012 for the following wells:

- Longbow 003-2821H, 208-28H (Pad # 52, SESW Sec 28 T42N, R71W, Lease WYW139065, Fee),
- Longbow 05-30H, 06-30H, 203-30H, 204-30H (Pad # 51, SESW Sec 30 T42N, R71W, Lease Fed WYW105937, WYW 140770, Fee),
- Longbow 205-30H, 09-30H (Pad # 255, NWNE Sec 30 T42N, R71W, Lease Fed WYW105937, WYW140770),
- Longbow 07-32H, 200-32H(Pad # 49, SWSE Sec 32 T42N, R71W, Lease Fed WYW055069, WYW 089169),
- Longbow 10-32H and 202-32H (Pad # 261, SESW Sec 32 T42N, R71W, Lease Fed WYW055069).

1.2. Need for the Proposed Project (Proposal)

The need for this project is to determine whether, how, and under what conditions to support the Buffalo Resource Management Plan's (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. BLM Washington Office Instruction Memorandum (IM) No. 2009-078 established policy and procedures for processing federal APDs for horizontal drilling into federal mineral estate from multiple well pads on non-federal locations (applicable to this EA). Drilling and producing the subject wells is a federal action. Construction, operation, and reclamation of infrastructure on non-federal land are not federal actions. Drilling and producing mitigation measures are in the Conditions of Approval (COAs) for Conventional Application for Permit to Drill.

This EA addresses the material environmental effects of anticipated construction, operation, abandonment, and removal of all wells and their infrastructure. Full effects of the action, COAs, and recommended mitigation measures (RMMs) are in this EA (Longbow Multi-Well Pads Project, WY-070-EA13-13 and BLM RMMs for Conventional Application for Permit to Drill.

1.4. Scoping and Issues

BLM posted the proposed APDs for 30 days and will timely publish the EA, its finding, and decision on the BFO website. Previously BFO conducted extensive external scoping for the PRB FEIS; see p. 2-1 of the PRB FEIS and p. 15 of the PRB ROD. This project is similar in scope to other fluid mineral development the BFO analyzed. Scoping (external and internal) did not identify new issues, as verified with recent fluid mineral EAs BLM externally scoped. External scoping of the horizontal drilling in Crazy Cat East EA, WY-070-EA13-028, 2013, received 3 comments, revealing no new material issues.

The BFO interdisciplinary team (ID team) conducted internal scoping by reviewing the proposal, its location, and a resource (issue) list (see administrative record, AR), to identify potentially significant impacts, land uses, resource issues, regulations, and site-specific circumstances not addressed in the tiered analysis or other analyses incorporated by reference. This EA will not discuss resources and land uses that are not present, unlikely to be significantly affected, or that the PRB FEIS or other analyses adequately addressed. This EA addresses the project's potentially significant 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. Project issues include:

- Air quality
- Soils and vegetation: site stability, reclamation potential, riparian and wetland communities, invasive species
- Water: ground water, quality, and quantity of produced water.
- Wildlife: raptor productivity, migratory birds, special status species
- Cultural: National Register eligible sites

The following issues are not present, or minimally so. BLM analyzed them in the PRB FEIS. This EA will not further analyze them:

Geological resources	Cave and karst resources	Rights of way & corridors
Recreation	Visual resources	Lands & realty
Wilderness characteristics	Socio-economic resources	Transportation & access
Paleontological resources	Mineral resources: locatable, leasable-coal, salable	Environmental justice
Livestock & grazing	Forest products	Tribal treaty rights
Areas of critical environmental concern	Fire, fuels management, and rehabilitation	

2. PROPOSED PROJECT AND ALTERNATIVES

BLM analyzed 2 alternatives (Alternative A and Alternative B) to determine how to better meet the BLM's need. A brief description of each alternative follows.

2.1. Alternative A – No Action

The no action alternative would deny these APDs requiring the operator to resubmit APDs that comply with statutes and the reasonable measures in the PRB RMP Record of Decision (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 – tiering to or incorporating by reference the analyses and developments approved by the subsequent NEPA analyses for adjacent and intermingled developments to the proposal area.

2.2. Alternative B – Proposed Action (Proposal)

EOG Resources, Inc., Longbow Multi-Well Pads Project (proposal) is an oil and gas exploration project in Campbell County, Wyoming. The project area is in a coal bed natural gas (CBNG) production area. The BLM issued NEPA-based findings and decisions covering 50 wells for EOG in the adjacent area. EOG proposes up to 6 wells per pad on 5 well pads for this project (long-term). The project area is 15 miles south southeast of Wright and 5 miles northwest of Teckla, and 1 to 4 miles west of Wyoming State Highway 59 (see generally, Figure 2.1). The project area has 3,312 acres in about 5.2 square miles in Township 42 North, Range 71 West. The proposal area is in the Thunder Basin National Grasslands, yet occurs entirely on private land – clearly lacking wilderness characteristics. The surface owner is Jerry J. Dilts Family LPI. Isenberger, LLC is the surface owner over some of the proposed access roads.

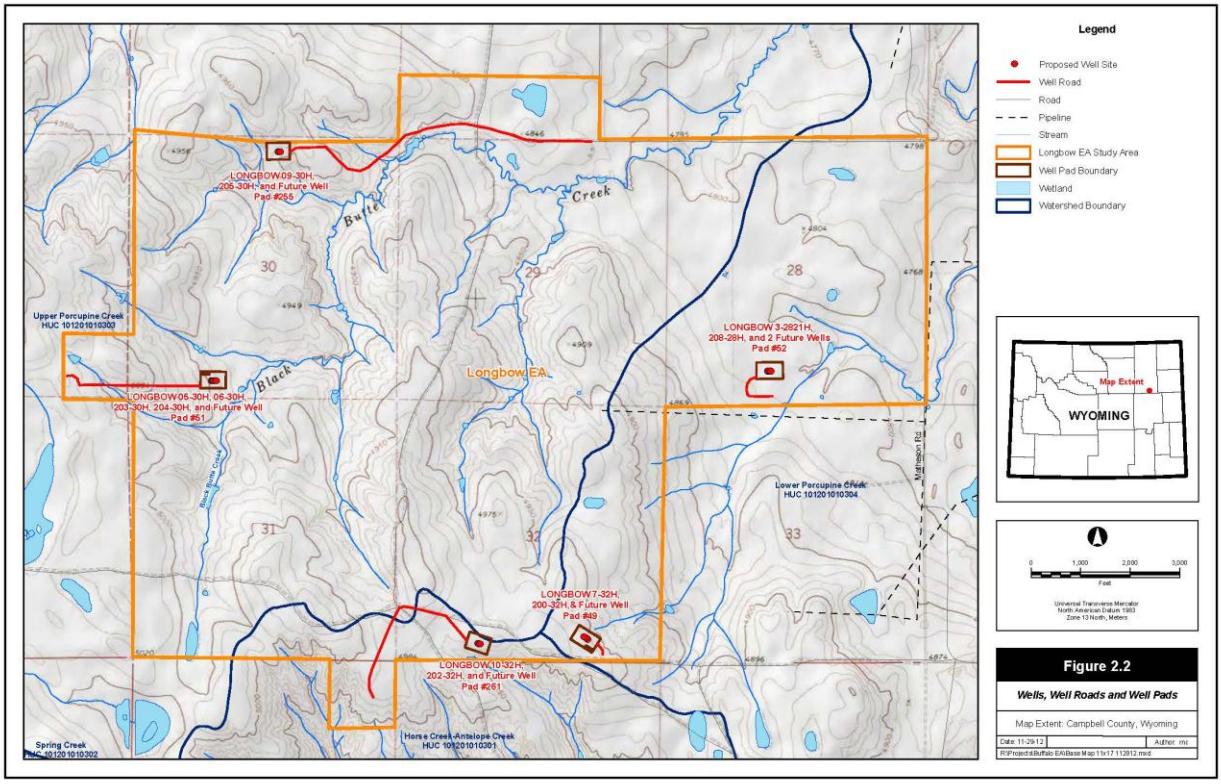
EOG proposes to explore for and develop oil and natural gas reserves underlying oil and gas leases they own draining the Turner, Parkman, Niobrara, and Mowry Formations and other potential zones. When BLM prepared this analysis, EOG submitted 12 APDs to the BLM, Tables 2.1 and 2.2. If EOG pursues drilling the other 18 well bores, they will submit APDs to the BLM. Up to 6 wells would be horizontally drilled from each well pad with wellbores spaced up to 24-feet apart to minimize surface disturbance and other potential resource impacts. The number of wells proposed on each well pad is dependent on spacing rules, mineral estate, and geological factors.

Table 2.1 Well Pad Number/Well Name and Number/Lease/Location

#	Well Name	Well #	Pad #	Twp	Rng	Sec	Qtr*	Surface Lease	Lateral Lease(s)	BHL Lease
1	LONGBOW	208-28H	52	42N	71W	28	SESW	FEE	WYW89169	FEE
2	LONGBOW	3-2821H								
									WYW129497	
									WYW139065	
3	LONGBOW	203-30H	51	42N	71W	30	SESW	WYW105937	WYW140770	
4	LONGBOW	204-30H							FEE	
5	LONGBOW	5-30H							WYW140770	
6	LONGBOW	6-30H							FEE	
7	LONGBOW	9-30H	255	42N	71W	30	NWNE	WYW105937	WYW140770	
8	LONGBOW	205-30H								
9	LONGBOW	10-32H	261	42N	71W	32	SWSE	WYW55069	WYW55069	
10	LONGBOW	202-32H								
11	LONGBOW	7-32H	49	42N	71W	32	SESW	WYW55069	WYW89169	
12	LONGBOW	200-32H								

*Quarters are for illustration only since lots denote surface boundaries; see APDs in the Administrative Record.

Figure 2-1 – Project Location, Wells, Access Roads,& Well Pads – Campbell County, WY



EOG's plan of development is to drill the first 2 wells on each well pad back-to-back. The additional wells on each pad may be drilled later than the first pair, depending on the performance of the first 2 wells, and additional reservoir evaluation. Associated infrastructure would include access roads, gathering lines, and power lines required for access to the well pads, and operations of oil and gas production. The life of each productive well is anticipated to be up to 40 years.

2.2.1. Access

Wyoming State Highway 59 is the project's primary access. It runs generally north/south to the west of the project area. EOG proposes building new access roads off of existing well field and two-track ranch roads to the proposed pads (Figure 2.1 and AR). Existing roads and new roads would be maintained in the same or better condition than existed prior to the commencement of EOG operations. Maintenance of roads serving the project would continue until abandonment and reclamation of wells. Road rights-of-way (ROW) for construction in the project area would be 40 feet wide. The new roads would typically be a single lane, 16 feet wide, 40 feet subgrade, crowned road with BMPs installed as necessary. The access road would be constructed with a 4:1 slope for ditches. Rip-rap would be used as needed. A minimum average of 4 inches of topsoil would be stripped from the new access road prior to any further construction activity; topsoil would be stored along the sides of the road for back spreading following road construction. EOG would require an estimated 2.8 miles of new access roads to provide equipment and vehicle access to the proposed 5 well pads. New access road construction would result in approximately 13.1 acres of surface disturbance (Tables 2.3 and 2.4). For specifics on construction practices, drilling, and production operations, refer to the APDs' master surface use (MSUP) and drilling plans. Site-specific maps, engineered drawings for production facility diagrams, and interim reclamation areas are included in the plats submitted with each APD.

Table 2.2 - Well Surface (SHL) and Bottom Hole Location (BHL)

		SHL					BHL				
Well Name & Number	**Pad ID #**	**Footage**		**Section**	**Township**	**Range**	**Footage**		**Section**	**Township**	**Range**
Longbow 03-2821H	52	715 FSL	2104 FWL	28	42N	71W	460 FNL	460 FWL	21	42 N	71W
Longbow 208-28H		715 FSL	2080 FWL	28	42N	71W	660 FNL	660 FWL	28	42 N	71W
Longbow 05-30H	51	320 FSL	1560 FWL	30	42N	71W	460 FNL	460 FWL	30	42 N	71W
Longbow 06-30H		200 FSL	1560 FWL	30	42N	71W	460 FSL	2600 FWL	31	42 N	71W
Longbow 203-30H		200 FSL	1560 FWL	30	42N	71W	660 FNL	660 FWL	30	42N	71W
Longbow 204-30H		200 FSL	1560 FWL	30	42N	71W	660 FSL	2600 FWL	31	42 N	71 W
Longbow 205-30H	255	200 FNL	2407 FEL	30	42N	71W	660 FSL	1560 FEL	30	42 N	71 W
Longbow 09-30H		200 FNL	2431 FEL	30	42N	71W	460 FSL	1560 FEL	30	42 N	71 W
Longbow 07-32H	49	421 FSL	1460 FSL	32	42N	71W	460 FNL	2600 FEL	32	42 N	71 W
Longbow 200-32H		446 FSL	1501 FSL	32	42N	71W	660 FNL	2600 FEL	32	42 N	71 W
Longbow 10-32H	261	367 FSL	1652 FWL	32	42N	71W	460 FNL	460 FWL	32	42 N	71 W
Longbow 202-32H		360FSL	1674 FWL	32	42N	71W	660 FNL	460 FWL	32	42 N	71 W

EOG may decide whether to propose another 18 APDs based, in part, on resolution of production uncertainties. (FSL – from the south line; FWL – from the west line; FNL – from the north line; FEL – from the east line)

Table 2.3. Well Pad Area Totals (Disturbance, Reclamation, and Roads in Acres)

	Pad ID #	**Max # of wells**	**Acres of Pad Disturbance**	**Approx. Interim Reclamation**	**Access Road**	**Access Road**
	51	6	5.2	1.9 acres	0.5 miles	2.5 acres
	261	6	4.8	1.9 acres	0.7 miles	3.3 acres
	52	6	5.2	1.8 acres	0.2 miles	0.9 acres
	255	6	4.8	1.7 acres	1.3 miles	6.2 acres
	49	6	5.2	2.1 acres	0.1 miles	0.2 acres
Total	**5**	**30**	**25.2**	**9.4 acres**	**2.8 miles**	**13.1 acres**

2.2.2. Drilling, Construction and Production Design Features

EOG anticipates drilling and construction would be completed 3 years after initiation. Drilling and construction activities occur year-round in the region. Weather may cause delays but delays rarely last more than several weeks. Timing limitations in the form of conditions of approval (COAs) and/or agreements with surface owners may impose longer temporal restrictions. Design features include:

- A road network consisting of existing improved roads and proposed constructed access roads.
- Potential production facilities for a typical two-well pad with separate interests would consist of twelve 400-barrel tanks, 2 housed high-pressure combustors (36-inch diameter) and 2 housed low-pressure combustors (48-inch diameter). The combustion units would be placed on the cut portion of the location, a minimum of 20 feet from the toe of the back cut.
- All engines would be equipped with an adequate muffler system, decibel level not to exceed 70 decibels at a distance of 200 feet from the exhaust of any muffler.
- There would be no pits at the producing location. All wells would be drilled semi-closed loop utilizing a 10-foot deep bermed area for burial and remediation of drill cuttings.

2.2.3. Drilling and Completion Water Sources and Amounts

EOG's proposal includes using hydraulic fracturing. The project would be subject to the COAs for drilling of an oil/gas well in the BFO jurisdiction. EOG proposes to use fresh water for drilling and cementing, water that would be obtained from outside the project boundary and hauled to location by transport trucks using the existing and proposed roads shown in Maps A and C of the plats submitted with the APDs; see AR. EOG plans to obtain fresh water from the City of Wright, Wyoming or the Arbalest Water Well 1-13 in Section 13-T41N-R72W, Crossbow 1-07 in Section 7-T41N-R71W and the Reno 1-01 in Section 7-T41N-R72W. EOG may obtain additional water from a municipal water source, if needed. EOG obtained a water appropriation permit through the State of Wyoming Office of State Engineer. The depth of the Fox Hills Formation is about 5,000 to 5,500 feet in the proposal boundary. Refer to the EOG drilling plan submitted with the APDs for protection features for the Fox Hills and coal aquifers. EOG estimated 11,900 barrels of water (approximately 15 truckloads per day) would be required for drilling each well. EOG estimated 24,000 barrels of water and approximately 26 truckloads per day are required for completion operations on the first well located on a pad. Each additional well would require the same amount of water but the truckloads per day would be reduced to 18.

Figure 2.2 shows the surface and bottom hole locations for each well. Refer to the APDs' surface use plan (SUP) and drilling plan for a detailed description of the design features. Also see the APDs for maps the proposed well location and associated facilities. All proposed wells in Table 2.1 produce from or cross federal minerals. BLM incorporated and analyzed the implementation of committed mitigation measures in the SUP and drilling plan, the COAs in the PRB FEIS ROD, and changes made at the onsites.

Additionally, EOG 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 measures to alleviate resource impacts into their submitted surface use and drilling plans.
- Certify it has a surface access agreement with the landowner or posted a 43 CFR 3814.1 bond. The operator provided the BLM a true and complete copy of a document in which the owner of the surface authorizes the operator to drill a federal well from non-federal lands, and in which the surface owner or representative guarantees the Department of the Interior (Department), including BLM, access to the non-federal lands to perform all necessary surveys and inspections, (see Instruction Memorandum No. 2009-078, p. 2, paragraph 6).

Figure 2-2 – Bottom Hole/Surface Hole Locations

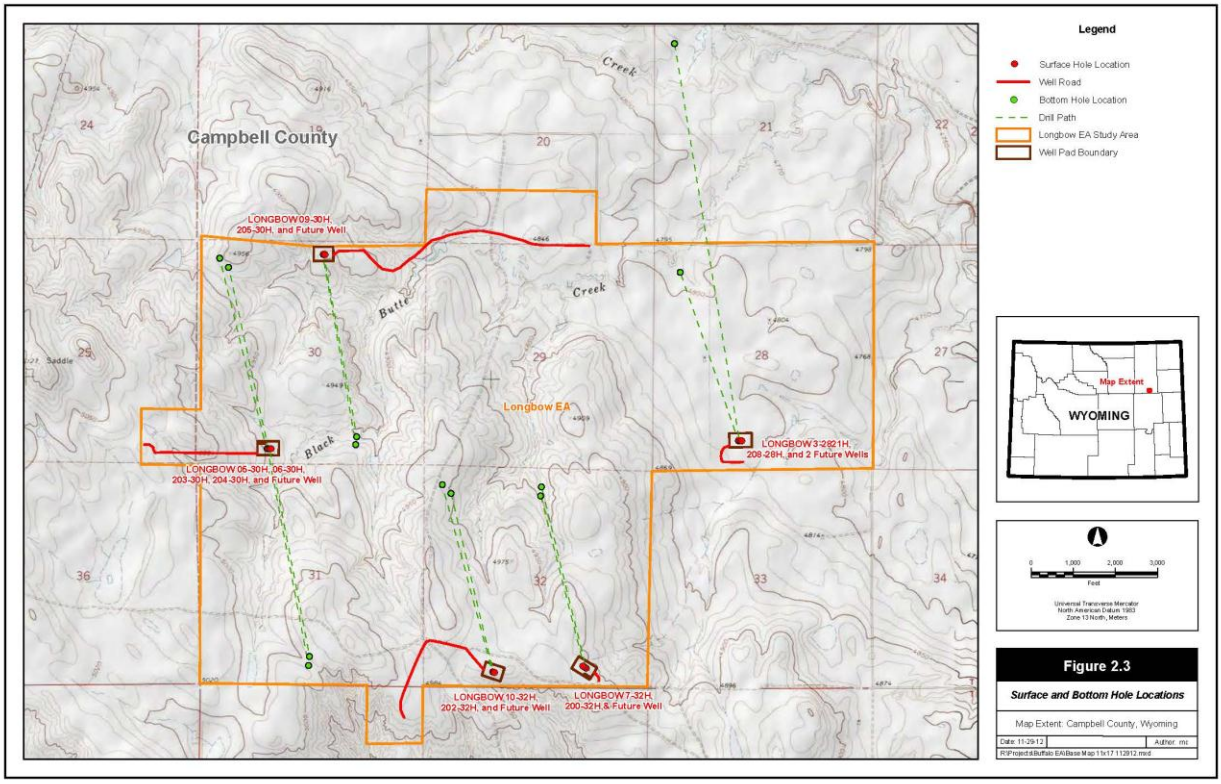


Table 2.4. Disturbance During Construction and Interim/Production

Activity	Length Surface (feet)	Width Surface (feet)	Disturbance (acres)
Pad ID # 51			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	5.2
Access Road	2,727	40	2.5
Total Initial Disturbance	---	---	7. 7
Pad ID # 261			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	4.8
Access Road	3,590	40	3.3
Total Initial Disturbance	---	---	8.1
Pad ID # 52			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	5.2
Access Road	981	40	0.9
Total Initial Disturbance	---	---	6.1
Pad ID # 255			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	4.8
Access Road	6,791	40	6.2
Total Initial Disturbance	---	---	11
Pad ID # 49			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	5.2
Access Road	257	40	0.2
Total Initial Disturbance	---	---	5.4

EOG estimates that during the drilling phase of each individual well (about 20-25 days per well) the average daily truck traffic to and from the location would be approximately 15 large trucks (water haulers, cement trucks, etc.) and 3 personal pickup trucks per day. During the well completion process (a two week period per well), the average daily traffic would increase to 26 large trucks and two personal pickup trucks per day. The average daily truck traffic would drop to 18 trucks per day for any additional wells located on a pad. The personal truck traffic would remain the same. Finally, during the production phase the average daily traffic would decrease to one or fewer pickup trucks per day.

Mineral developments are prevalent in the PRB. Refer to the PRB FEIS (2003) and BLM BFO RMP (2010, amended) for an assessment of the reasonably foreseeable development scenario. The PRB FEIS analyzed 54,200 wells (51,000 CBNG and 3,200 natural gas and oil wells), associated infrastructure, and water use (estimated 8,960 ac-ft of water for 3,200 wells) as part of the reasonably foreseeable development scenario. EOG is proposing other development projects in the analysis area of this proposal, to include Bolt (up to 30 well bores) and Ballista-Flatbow (up to 78 well bores).

2.2.4. Completion Process

Once a well is drilled and cased, a completion (work-over) unit would be moved onto the well site and completion operations would commence. The stimulation procedure initially contains the pressure of the job in the target formation. These completion operations would generally require an average of 30 days for wells of this depth and would typically consist of:

- -cleaning out the well bore;
- -pressure testing the casing;
- -perforating and fracturing (as appropriate) the Teckla, Parkman, Niobrara, Mowry, Sussex and other formations in the horizontal portion of the hole; and
- -running production tubing in the event that commercial production is established at that point.

In conjunction with these completion operations, EOG may elect to hydraulically fracture selected intervals in the targeted formation in order to “stimulate” production. These hydraulic fracturing jobs would typically consist of pumping a mixture of sand and water down hole under pressure with this mixture forced through the existing perforations or ports into the formation. Hydraulic fracturing is designed to confine pressure to the producing formation for potential hydrocarbon recovery. As the formation is fractured, the resultant fissures (fractures) are filled with sand that keeps them open and facilitates the flow of oil and gas into the well bore and subsequently to the surface.

For those horizontal wells, EOG would conduct hydraulic fracturing operations on the entire length of the lateral (horizontal well bore) in stages commencing at the terminus of the well bore (bottom hole location) and working backward to the beginning of the lateral section. A combination of fresh water, sand (proppant) and selected additives (including potassium chloride resulting in a 3 percent potassium chloride (KCl) solution as the base hydraulic fracturing fluid) would be used to fracture and stimulate production. These additives would be mixed in steel tanks on location immediately prior to the completion operation and would not be introduced into any surface pits on the existing well location. Thirty-five thousand barrels (1.47 million gallons) of freshwater would be stored in above ground tanks on each horizontal well. EOG will obtain this water from wells and/or commercial sources in or near the project area and no water would be diverted from the North Platte River or its tributaries.

Upon completion of the hydraulic fracturing operation, the well would be flowed back to the surface through temporary production equipment in an attempt to recover as much of the fluids as possible and to clean excess sand out of the lateral prior to setting production equipment on location and commencing production. All fluids returned during the flow-back procedure would be captured in steel tanks situated on the well location. These recaptured fluids would ultimately be disposed of in strict accordance with both BLM and WOGCC rules and regulations. Any fresh water remaining in the hydraulic fracturing

reservoir following the completion operations would be used for future completion activities on other wells in the overall project area, with the proper approvals from the BLM and/or WOGCC, as appropriate. EOG uses a semi-closed loop system and no pits will be constructed, see drilling plan, AR.

2.2.5. Resource Mitigation and Project Design Features

EOG provided design features and mitigation measures that avoid, reduce, and minimize impacts to specific resources. Resource protection/mitigation design features associated with this project include:

- Reducing the number of well pads required in a section by drilling multi-lateral, multi-formation wells from a single well pad.
- Using telemetry and remote monitoring equipment and techniques that reduce the number of physical visits to each well pad.
- Modifying pad and facility layouts and design creating visual screens between sensitive resources and concentrated activity.
- Abiding by orders identified in Onshore Oil and Gas Order No. 1, III.D.4, and IV.C, Surface Use Plan of Operations. The operator would not conduct operations in areas subject to mass soil movement, riparian areas, floodplains, lakeshores and/or wetlands.

2.3. Conformance to the Land use Plan and Other Environmental Assessments

This proposal does not diverge from the goals and objectives in the Buffalo RMP, 1985, 2001, 2003, 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 that may be significantly affected by the implementation of the alternatives in Section 2, or where changes in circumstances or regulations occurred since the analyses to which the EA tiers or incorporates by reference. The PRB FEIS considered a no action alternative (pp. 2-54 to 2-62) in evaluating a development of up to 54,200 fluid mineral wells. Most of the PRB's CBNG wells and over 60% of the deep oil and gas wells are hydraulically fractured (BLM and Goolsby 2012). The BLM uses the aggregated effects analysis approach, incorporating by reference the circumstances and developments approved via the subsequent NEPA analyses for adjacent and intermingled developments coincident to proposal area, to retain a contemporary and realistic perspective in the present situation and the no action alternative. The current situation and the no action alternative must consider and combine the PRB FEIS analysis with, incorporating by reference, the subsequent analysis and development from the adjacent and intermingled projects presented in Table 3.1.

Table 3.1. Adjacent or Overlapping NEPA Analyses BLM Incorporates Here By Reference

POD Name/Operator	NEPA Document	Well # /Type	Approval
Antelope 11/Lance	WY-070-05-132	49/CBNG	08/18/05
Antelope Flat/Coleman	WY-070-05-175	13/CBNG	08/18/05
Uprising/Yates	CX 04-305	43/CBNG	08/18/04
Uprising Add/Coleman	CX070-08-3-009 and 038	2/CBNG	01/18/08
SW Reno Flats/Coleman	WY-070-07-196	26/CBNG	09/21/07
EOG / Crossbow well #s 5-18H, 6-18H, 19-18H	WYW-070-09-155	3/Oil	09/18/09
Project 785/EOG	WY-070-10-238	7/Oil	08/18/10
Project 808/EOG	WY-070-09-284	40/Oil	09/21/11
Hornbuckle Field EA/Samson	WY-60-EA11-189	96/Oil	08/2011
Cherokee Ridge Alpha/Petro-Hunt	WY-070-EA12-070	6/Oil	06/2012
Crazy Cat East EA	WY-070-EA13-028	About 36/Oil	03/2013

There are 525 mineral and two water injection wells within 4 miles of the proposal (WOGCC 2012b). The total number of conventional wells approved by BFO in the PRB is 359, which includes 193 horizontal wells (as of March 2012). The WOGCC permitted 103 wells. The total is 453, which represents 14% of the projected 3,200 in the 2003 PRB ROD. The current oil and gas related surface disturbance in the project area is over 60 acres. This agrees with the PRB FEIS that analyzed the reasonably foreseeable development rolling across the PRB of over 51,000 CBNG and 3,200 natural gas and oil wells. The State of Wyoming and BLM also approved dozens of wells that operators may develop in the near future. In addition, operators are likely to continue seeking permits to develop unconnected leases in or in the affects analysis areas near this proposal. BLM decisions to approve or deny future proposals will occur following APD submittal. Development occurring on fee surface and mineral estate would continue.

Analyses of the affected environment here focus on the major issues. See subsection 1.4 for 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 in the analysis area 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, and fn. 7 and 2013-005, pp. 2-3. This supports national policy where no distinction exists in 43 CFR 3160 et. seq, leasing, APD Form 3160-3, and 2005's Energy Policy Act. (Kreckel 2007) The US Geological Survey noted there is only a remote chance of induced seismic activity from the nation's hydraulic fracturing and water injection at volumes contemplated in the PRB.

The area topography has low rolling hills from 4,785 to 5,020 feet elevation (the well pads are from 4,805 to 4,926 feet elevation). Named area drainages include Black Butte, Porcupine, and Lower Porcupine Creeks - all tributaries to the Cheyenne River. Isolated riparian areas have sparse cottonwoods, scattered juniper, and scattered dense sagebrush. The primary private land uses are ranching and recreational hunting. Grasslands with areas of sparse, short sagebrush dominate the area's vegetation. Precipitation averages 10 to 14 inches per year. Most of the precipitation occurs in late winter and spring. The surface ownership in the analysis area is a mix of private, state, and federal surface, with cattle grazing, coal mining, and oil and gas development as the primary surface uses. Table 3.1 lists existing NEPA analyses adjacent to and in the EA boundary of which BLM incorporates here by reference.

3.1. Air Quality

WDEQ regulates Wyoming's air quality with oversight from the U.S. Environmental Protection Agency (EPA). BLM incorporates by reference the August 2012 Lease Sale EA, WY-070-EA12-44, pp. 17-24 (air quality, greenhouse gas emissions, and visibility); and the Update of Task 3A Report for the Powder River Basin Coal Review Cumulative Air Quality Effects for 2020, BLM (AECOM), 2009, (Cumulative Air Quality Effects, 2009) as it captures the cumulative air quality effects of present and projected PRB fluid and solid mineral development. The EPA established ozone standards in 2008, finalizing them in 2011. Existing air quality in the PRB is "unclassified/attainment" with all ambient air quality standards. It is also in an area that is in prevention of significant deterioration zone.

PRB air quality is a rising concern because of ozone in the oil and gas producing Upper Green River Basin that became 1 of the nation's 40 "nonattainment" zones for ozone in 2012; in addition to PRB-area air quality alerts issued in 2011 - 2013 for particulate matter (PM), attributed to coal dust. Four sites monitor the air quality in the PRB: Cloud Peak in the Big Horn 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 6 sites, and particulate concentrations from 5 of those sites, monitors speciated aerosol (3 locations), and evapotranspiration rates (3 locations). These sites are at Sheridan, Taylor Reservoir, South Coal Reservoir, Buffalo, Juniper, and

Newcastle. The northeast Wyoming visibility study is ongoing by the Wyoming Department of Environmental Quality (WDEQ). 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 CO and nitrogen oxides (NOx)) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions of combustion pollutants;
- PM (dust) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas, road sanding during the winter months, coal mines, and trains;
- Transport of air pollutants from emission sources located outside the region;
- NOx, PM, and other emissions from diesel trains; and
- SO2 and NOx from power plants.

3.2. Soils and Vegetation

Project area 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 in the area. An erosion resistant cap of clinker, terrace gravels, or sandstone often protects ridges and hills. Parent material chemistry may result in local concentrations of salts. Soils differ with topographic location, slope, and elevation. Topsoil depths available for reclamation range from 0 to 4 inches on ridges to 8 or more inches in bottomland. Erosion potential varies depending on the soil type, vegetative cover, and slope. Reclamation potential of soils also varies throughout the project area. The area's main soil limitations include: depth to bedrock, low organic matter content, and high erosion potential, especially in areas of steep slopes.

The Campbell County Survey Area, Wyoming Soil Survey Geographic (SSURGO) Database (WY605) provides detailed soils identification and data. NRCS performed the soil survey according to National Cooperative Soil Survey standards. The BLM uses county soil survey information to predict soil behavior, limitations, or suitability for an activity. The BLM's long-term goal for soil resource management is to maintain, improve, or restore soil health and productivity, and to prevent or minimize soil erosion and compaction. Soil management objectives are to ensure that adequate soil protection is consistent with the resource capabilities. Many of the soils and landforms in this area present challenges for development and /or site reclamation. Figure C.1 depicts the individual soil units in the project area.

Dominant soils in the proposal area are fine-loamy, mixed, mesic, Ustic Haplargids, Ustic Haplocambids, Ustic Paleargids, and Ustic Torriorthents. Major soil series and complexes that are common at each well pad are described below. Table 3.2 shows the dominant soil types for each well pad. See the *Soil Survey of Campbell County, Wyoming* (NRCS 2007), at: https://soilseries.sc.egov.usda.gov/osdname.asp.

Table 3.2. Dominant Soils by Map Unit Symbol (MUS) as Percentage of Well Pads

MUS	Pad #	Map Unit Name	Acres	%of Pad
208	51	Savageton-Silhouette clay loams, 0 to 6 percent slopes	5.0	96.2
228	261	Ulm-Renohill clay loams, 0 to 6 percent slopes	3.8	80.0
208	52	Savageton-Silhouette clay loams, 0 to 6 percent slopes	4.2	81.2
199	49	Renohill-Savageton clay loams, 0 to 6 percent slopes	5.1	97.7
226	255	Ulm loam, 0 to 6 percent slopes	3.7	77

The Savageton-Silhouette clay loams consist of very deep well-drained soils formed in alluvium derived from shale with slopes ranging between 0 and 6%. The Savageton and Silhouette soils are found on alluvial fans, fan remnants, ridges, relict terraces, and hills. Permeability is slow and runoff potential is medium to high depending on slope for these loams. The A horizon in these soils is typically thin and less than 2 inches. These soils are of limited extent and are primarily used for grazing. Principal native vegetation is western wheatgrass, sedge, blue grama, cactus, green needlegrass and birdsfoot sagebrush.

The Savageton-Silhouette clay loams consist of very deep well-drained soils formed in alluvium derived from shale with slopes ranging between 0 and 6%. The Savageton and Silhouette soils are found on alluvial fans, fan remnants, ridges, relict terraces, and hills. Permeability is slow and runoff potential is medium to high depending on slope for these loams. The A horizon in these soils is typically thin and less than 2 inches. These soils are of limited extent and are primarily used for grazing. Principal native vegetation is western wheatgrass, sedge, blue grama, cactus, green needlegrass and birdsfoot sagebrush.

The Ulm-Renohill complex has very deep, well-drained soils that are formed in calcareous alluvium derived from sedimentary rock. Ulm soils are fine soils located on relict terraces, alluvial fans, fan remnants, plateaus, ridges, and hills with slopes of 0 to 6 percent. The runoff potential is medium and permeability ranges from slow to moderate. Primary uses for Ulm soils include dryland farming and livestock grazing. The Renohill soil is moderately deep and well-drained and formed in clayey residuum derived dominantly from calcareous shale. Permeability is slow for Renohill soils. The plant community typically associated with these soils is mainly grasses: western wheatgrass, blue grama, big sagebrush and green needlegrass. Main uses are livestock grazing and wildlife habitat. The soils in this complex have a varying A horizon ranging from 0 to 4 inches.

The Ulm series has an average A horizon thickness of 4 inches and is of moderate distribution within the central Rocky Mountain Region. The runoff potential is medium and permeability ranges from slow to moderate. Primary uses for the Ulm soils include dryland farming and livestock grazing. Native vegetation is mainly western wheatgrass, blue grama and big sagebrush.

The Renohill-Savegeton clay loams are well-drained soils that are moderately deep to soft bedrock. These fine soils are formed in alluvium, colluvium, and residuum. Renohill soils are on bedrock controlled plateaus, alluvial fans, hills, and ridges with slopes that are 0 to 6%. The runoff potentials for the Renohill soils vary based on slope and can range from low to high. Permeability for these soils is slow. The Savageton series consists of moderately deep, well-drained, slowly permeable soils. They formed in alluvium, colluvium, and residuum derived dominantly from shale on hills, ridges, fan remnants, fan piedmonts and fan aprons. The A horizon varies from 0 to 5 inches in thickness and primary land uses include rangeland, wildlife habitat, and small hay or small grain croplands. Native vegetation is western wheatgrass, green needlegrass, blue grama, scattered big sagebrush, sedge, blue grama, and cactus.

Mapping a single taxonomic soil class is rare without including areas of other taxonomic classes. Consequently, every map unit comprises the soils or miscellaneous areas for its name and some minor components that belong to taxonomic classes other than those of the major soils. Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are non-contrasting or similar components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics sufficiently divergent to affect use or to require different management. These are contrasting or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Map unit descriptions mention the contrasting components. In complex soil patterns minor components may avoid observation and discussion as it's impractical to identify all the soils and miscellaneous areas on the landscape. The presence of minor components in a map unit does not diminish the usefulness or accuracy of the data. The objective of mapping is to separate

the landscape into landforms or landform segments that have similar use and management requirements, and to delineate pure taxonomic classes. The map delineation of segments provides sufficient information for the development of resource plans. Onsite investigation defines and locates the soils and miscellaneous areas where plans call for intensive use of small areas.

3.2.1. Soils Susceptible to Erosion

Soil formation is a very slow process. Most soils cannot renew their eroded surface and productivity while erosion continues. The development of a favorable rooting zone by the weathering of parent rock is much slower than development of the surface horizon. One estimate of this renewal rate is 0.5 tons per acre per year for unconsolidated parent materials, and much less for consolidated materials. Because of these very slow renewal rates, soil erosion should be minimized as much as possible. Loss of organic matter, resulting from erosion and tillage, is one of the primary causes for reduction in production yields. When organic matter decreases, soil aggregate stability, the soil's ability to hold moisture, and the action exchange capacity decline. (Soil Quality-Agronomy Technical Note #7, USDA, Aug 1998)

The project area soils are susceptible to erosion in varying degrees. A sandy ecological site has sand ranging from 52 to 80% in the top few inches and clays ranging from 10 to 18%. These sandy ecological sites are found on ridge tops with topsoil depths averaging 2 to 4 inches and are susceptible to wind and water erosion based on relatively small amounts of clay and little water holding capacity. One small section of the access road to Pad #255 crosses a sandy ecological site. EOG would stabilize and reclaim this area, as described in their MSUP. Table 3.3 shows the relative erosion potential in the EA boundary.

Table 3.3. Relative Erosion Potential within EA Boundary

Erosion Potential (wind & water)	Acres	% of Project Area
Slight/Moderate	3,203.1	93.3
Severe	228.9	6.7

Source: NRCS 2010

3.3. Vegetation and Ecological Sites

BLM's onsite inspections confirmed that the area's dominant vegetation community types are mixed grass prairie and sagebrush shrubland. Species typical of the mixed-grass prairie community type are: needle-and-thread, western wheatgrass, blue grama, Sandberg's bluegrass, prairie Junegrass, upland sedges, and Indian ricegrass. Dominant or important ecological sites and plant communities identified in the project area are loamy, sandy and clayey. Refer to ecological site narrative sections below for description of vegetation species observed during onsite field visits.

Ecological site descriptions provide soils and vegetation information needed for resource identification, management, and reclamation recommendations. Using the Natural Resource Conservation Service, (NRCS, USDA), Technical Guides for the Major Land Resource Area 58B Northern Rolling High Plains, in the 10-14 inch Northern Plains precipitation zone, verified through onsite field reconnaissance, the project area primarily has of 3 ecological sites and plant communities (Table 3.4): loamy (10-14NP), sandy (10-14NP), and clayey (10-14NP). The Ecological Site interpretations include additional site-specific soil information. See the land cover types, Figure 3.1.

Loamy/Shallow Loamy Site description and plant community. This site occurs on steep slopes and ridge tops, but may occur on all slopes and is 46% of the project area. Landforms are typically hillsides, ridges, and escarpments. These soils are shallow (less than 20 inches to bedrock) well-drained, 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 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 in short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominate grasses include: bluebunch wheatgrass, rhizomatous wheatgrass, blue grama, and little bluestem. Other grasses may include Cusick's and Sandberg bluegrass, and prairie junegrass. Cheatgrass has invaded the state. Other vegetative species identified in the project area include: prickly pear and fringed sagewort.

Table 3.4. Ecological Sites and Soil Map Unit Symbols (MUS) in the Project Area

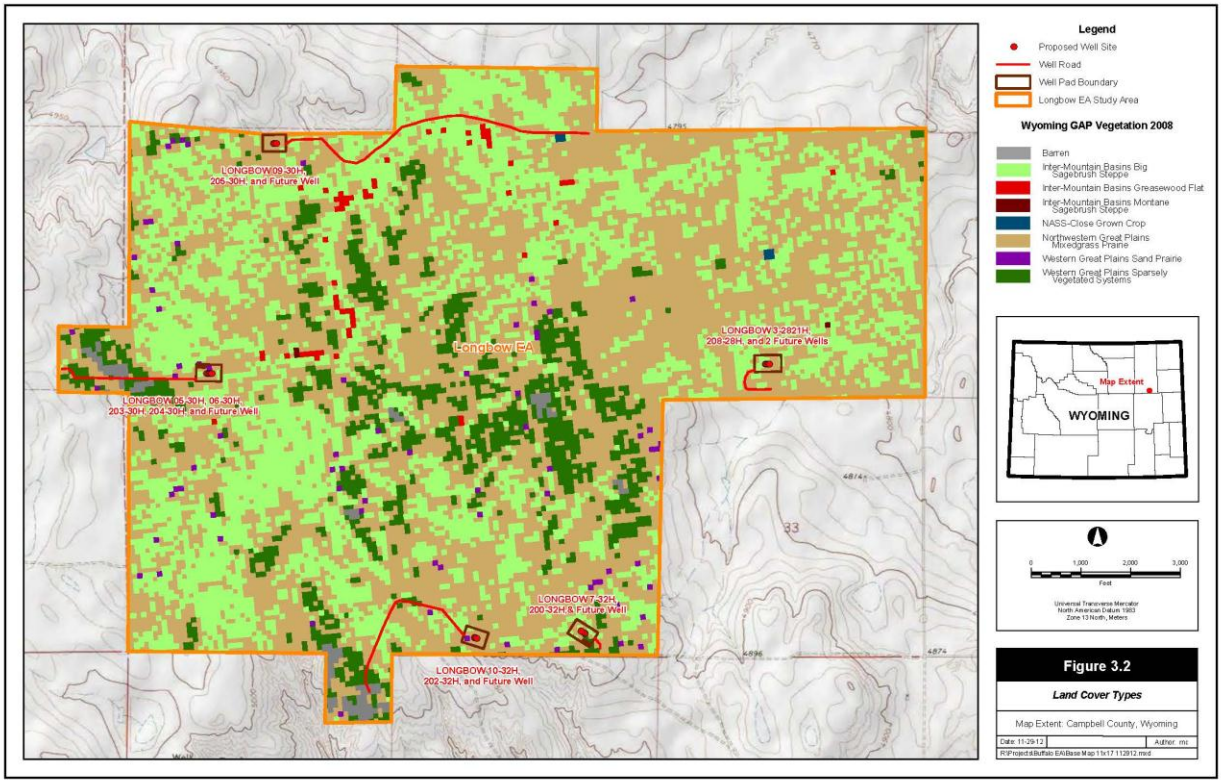
MUS			Ecological Site	Acres in Project Area	% of Project Area
111	146	216	Loamy (10-14 NP)	1,558	45
116	148	217			
117	214	226			
121	215				
199	208	228	Clayey Overflow (10-14 NP)	1,564	46
202	227				
115	158	233	Sandy (10-14 NP)	309	9
157	221				

Source: Soil Survey Geographic (SSURGO) database for Campbell County, Wyoming, Southern Part from the U.S. Department of Agriculture, Natural Resources Conservation Service.

Clayey Site description and plant community. Clayey sites occur on nearly level to steep slopes associated with hill sides, alluvial fans, and stream terraces in the 10-14 inch precipitation zone. This site is 46% of the project area. These soils are moderately deep to very deep (greater than 20 inches to bedrock), well-drained 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 are the majority of the understory with the balance being short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant grasses include rhizomatous wheatgrasses, green needlegrass, blue grama, and prairie junegrass. Forbs include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, and scarlet globemallow. Fringed sagewort and plains prickly pear also occur.

Sandy Site description and plant community. Sandy sites occur on nearly level to steep slopes and on landforms which include alluvial fans, hillsides, plateaus, ridges, and stream terraces in the 10-14 inch precipitation zone. This site consists of approximately 8 percent of the project area. The soils of this site are moderately deep to very deep (greater than 20 inches to bedrock), well-drained soils that formed in eolian deposits or residuum derived from unspecified sandstone. These soils have moderate, moderately rapid, or rapid permeability. The main soil limitations include low available water holding capacity, and high wind erosion potential. The present plant community is similar to the Loamy site listed above with the following exception: Wyoming big sagebrush not as dominant.

Figure 3-1 – Land Cover Types



3.4. Water Resources

WDEQ regulates Wyoming's water quality with oversight from the EPA. The Wyoming State Engineer's Office (WSEO) regulates water rights and permitting impoundments for the containment of the State's surface waters.

3.4.1. Groundwater

The area's current and historical use for groundwater is stock or domestic water. Shallow alluvial aquifers are near ephemeral or intermittent streams, such as Porcupine Creek. Aquifers associated with the tertiary aged Wasatch and Fort Union formations underlie the project area. Included in these formations are coalbed aquifers. Water quality information obtained from some of the CBNG wells indicates water quality is acceptable for beneficial use for livestock (Coleman Antelope Flats NPDES 2005).

There are 525 CBNG and oil and gas and 2 water injection wells (WIW) in a 4-mile radius of the proposal (WOGCC). A search of the WSEO Ground Water Rights Database showed 10 stock water wells within 1 mile of the proposed wells with depths ranging from 0 to 445 feet 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 (PRB FEIS, p. 7-5). The EPA has an expansive, on-going study evaluating the aspects of hydraulic fracturing and has yet to issue new guidance.

3.4.2. Surface Water

Surface waters in the area are small agricultural stock ponds and reservoirs in slight isolated depressions or gullies associated with ephemeral and intermittent streams. In addition, CBNG impoundments are in the project area. The proposed well pads and their associated roads are in the Horse Creek-Antelope Creek watershed Lower Porcupine and Upper Porcupine Creek (AR). Named surface waters in the area include Black Butte Creek and Lower Porcupine Creeks. These drain into the Cheyenne River. Most of

the area drainages are ephemeral (flowing only in response to a precipitation event or snow melt); Black Butte Creek is 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 well-vegetated grassy swales without defined bed and bank. Refer to the PRB FEIS for a surface water quality discussion, pp. 3-48 to 3-49. EOG did not identify any natural springs within 1 mile of the proposed Longbow pads. See the PRB FEIS, pp. 3-36 to 3-56, for more information.

3.5. Minerals – Leasables; Locatables; Salables

Short-term surface disturbances for well pads in this proposal range from approximately 4.8 to 5.2 acres; associated improved access roads range from 0.2 acres to 2.5 acres. They average 5.5 acres for a typical deep oil well in the PRB (PRB FEIS, pp. 312; pp. 4-304 – 318.). There are 525 conventional and CBNG wells in the 4 mile-analysis of cumulative effects area for this proposal (WOGCC), as of July 31, 2012. No other mineral interests are in the vicinity of the project area. The North Antelope Rochelle active coal mine is 5.5 miles southeast of the project area -outside the coal conflict zone.

3.6. Wetlands/Riparian

The Longbow APDs are for proposed wells in the Upper and Lower Porcupine Creeks, and Horse Creek-Antelope Creek drainages - tributaries to the Cheyenne River. Ephemeral drainages, which flow into intermittent Porcupine and Black Butte Creeks, cross the area. The ephemeral drainages have gentle slopes with well-vegetated bottoms with numerous small head-cut features. Stock ponds, associated with CBNG wells, are scattered in the area. According to National Wetland Inventory (NWI) data, there are 37 potentially jurisdictional wetlands in the area, of an estimated 29 acres. Of these, 27 palustrine emergent wetlands are in the Upper Porcupine Creek drainage, 1 palustrine emergent wetland in Horse - Antelope Creek drainage, and 9 palustrine emergent wetlands in the Lower Porcupine Creek drainage (AR). Wetlands in the project area are typically restricted to the few intermittent streams and depressions that carry and can hold water for sufficient periods to support emergent vegetation (AR). The proposed access road for pads 51 and 255 would cross Black Butte Creek and a smaller ephemeral tributary.

3.7. Invasive/Noxious Species

No state-listed noxious or invasive plant infestations were found by reviewing inventory maps, databases, or during field investigations. Cheatgrass, and to a lesser extent, Japanese brome exist in the project area, but not at a major infestation level. These species are common in high densities and in numerous locations in northeast Wyoming. Studies in the PRB and semi-arid west show invasive and noxious weed infestations measurably increase out to 0.5 miles or more from surface disturbances (Gelbard 2003, Duniway 2010) and cheat grass infestations increase the likelihood and severity of wildfire (Balch 2013).

3.8. Fish and Wildlife

The PRB FEIS identified wildlife species occurring in the PRB, pp. 3-113 to 3-206. BLM performed a habitat assessment in the project area on May 23, 2012. The biologists evaluated impacts to wildlife resources and recommended project modifications where wildlife issues arose. BLM 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 project area. This section describes the affected environment for wildlife that are known to occur or likely to occur in or near the proposed project.

Wildlife and plant surveys for BLM species of management concern were conducted in the proposal area and near proposed development areas in the fall of 2010, 2011, and 2012. The surveys addressed raptor nests, potential Mountain Plover habitat, black-tailed prairie dog colonies, availability of suitable habitat and presence/absence surveys for Ute ladies'-tresses orchid (ULT), Bald Eagle wintering roosts, and Greater Sage-Grouse (GSG). The methods and findings of these surveys are summarized in a report prepared by Hayden-Wing Associates (HWA), "Preliminary Wildlife and Plant Report" (HWA 2012).

3.8.1. Big Game

The PRB FEIS discussed the affected environment for pronghorn (*Antilocapra amerciana*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), and elk (*Cervus elaphus*), pp. 3-117 to 3-122, 3-127 to 3-132, 3-122 to 3-127, and 3-132 to 3-140, respectively. The big game species occurring in the project area include pronghorn, mule deer, and white-tailed deer. Yearlong ranges occur in the area for each of these species. Yearlong range provides general use and support of a population of animals on a year-round basis. Elk are transient in the area. There are no designated elk seasonal ranges in the project area. There are no crucial big game habitats, parturition areas, or migration routes in or within 2 miles of the project area. Elk crucial winter range occurs 9 miles east of the project area. Mule deer crucial winter range occurs more than 36 miles to the east of the project area. White-tailed deer crucial winter range occurs more than 60 miles to the east. Pronghorn crucial winter year long range occurs 45 miles to the southwest of the project area. The current populations for pronghorn, white-tailed deer, and elk are above WGFD goals. Current populations for mule deer are below WGFD goals.

3.8.2. Small Game Birds

No Sharp-tailed Grouse leks were found in the area or within 2 miles (HWA 2012). This species is not expected to occur in the project area.

3.8.3. Non-Game

3.8.3.1. Raptors

The PRB FEIS discussed the affected environment for raptors, pp. 3-141 to 3-148. Raptor species that may occur in the proposal area include, Red-tailed Hawk (*Buteo jamaicensis*), Swainson's Hawk (*Buteo swainsoni*), Ferruginous Hawk (*Buteo regalis*), American Kestrel (*Falco sparverius*), Prairie Falcon (*Falco mexicanus*), Northern Harrier (*Circus cyaneus*), Short-eared Owl (*Asio flammeus*), and Great Horned Owl (*Bubo virginianus*). Ground and aerial raptor nest surveys conducted in 2012 identified 30 raptor nests (25 Ferruginous Hawk, 4 Golden Eagle, 1 Red-tailed Hawk) in the project area and the associated 0.5-mile buffer surrounding the area (HWA 2012). Twenty-nine of the 30 identified raptor nests were inactive. One active Ferruginous Hawk nest (BLM Nest ID #5482) is just north of the project area. This nest is not within 0.5 miles of proposed pads. Most raptor species nest in a variety of habitats including, but not limited to native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities. Suitable raptor nesting habitat exists in the area.

3.8.3.2. Migratory Birds

The PRB FEIS discussed the affected environment for migratory birds, pp. 3-150 to 3-153. Migratory birds are birds that relocate between various habitats or regions in order to fulfill metabolic, reproductive, or other life cycle requirements. The BLM-Fish and Wildlife Service (FWS) 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 in order to fulfill obligations under the Migratory Bird Treaty Act (MBTA). The MBTA and Bald and Golden Eagle Protection Act (BGEPA) are strict liability statutes requiring no intent to harm migratory birds through committing a take. BLM encourages voluntary design features and conservation measures supporting migratory bird conservation, in addition to appropriate restrictions. A wide variety of migratory birds may be found in the proposal area throughout the year. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Nationally, grassland and shrubland birds declined more consistently than any other ecological association of birds over the last 30 years (WGFD 2009).

The WGFD Wyoming Bird Conservation Plan (Nicholoff 2003) identified 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. Grassland vegetation dominates the project area. Many species that are of high management concern use grassland 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 occurring in grassland vegetation in northeast Wyoming, according to the Wyoming Bird Conservation Plan, are in Table 3.5. Several species are also BLM special status (sensitive) species (SSS). Those suspected to occur in the area include: Ferruginous Hawk, McCown's Longspur, Upland Sandpiper, Long-billed Curlew, Burrowing Owl, Baird's Sparrow, Lark Bunting, Grasshopper Sparrow, Chestnut-collared Longspur, Dickcissel, and Bobolink.

Table 3.5. Migratory Bird Species Occurring in Shortgrass Habitat, NE Wyoming (Nicholoff 2003)

Level	Species		Wyoming BLM BFO Sensitive	
Level I	Mountain Plover	Long-billed Curlew	Yes	Yes
	Ferruginous Hawk	Burrowing Owl	Yes	Yes
	McCown's Longspur	Short-eared Owl	No	No
	Upland Sandpiper	Baird's Sparrow	No	Yes
Level II	Lark Bunting	Dickcissel	No	No
	Grasshopper Sparrow	Bobolink	No	No
	Chestnut-collared Longspur		No	
Level III	None		None	

Migratory bird habitat within and surrounding the proposed well pads is less than suitable for nesting pairs of several migratory bird species because of the vegetation present. The dominant vegetative within the proposed project is pasture grasses (<2 feet) with small patches of yucca, sagebrush, and bare ground.

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

3.8.4.1. Threatened, Endangered, and Candidate

The FWS lists threatened, endangered, and candidate species per the Endangered Species Act (ESA). The FWS periodically posts a list of species having threatened, endangered, and candidate status and with the potential to occur in the FO's jurisdiction. The FWS 2012 list for Campbell County includes Ute ladies'-tresses orchid (ULT) (threatened), and Greater Sage-Grouse (GSG) (candidate). In addition to the listed species, FWS also includes guidance regarding the protection of migratory birds and wetland/riparian habitats. The following sections describe the ULT and the GSG.

3.8.4.1.1. Threatened: Ute Ladies'-tresses Orchid (ULT)

The FWS lists the Ute ladies'-tresses orchid (ULT, *Spiranthes diluvialis*) as threatened. The PRB FEIS discussed the affected environment for ULT, p. 3-175. The Wyoming Natural Diversity Database model 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 ULT populations are 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. BLM conducted habitat evaluations and occurrence surveys for ULT in 2010 and 2011 (HWA 2012), and identified no suitable habitats or populations in the project area.

3.8.4.1.2. Candidate: Greater Sage-Grouse (GSG)

The PRB FEIS has a detailed discussion on GSG ecology and habitat, pp. 3-194 to 3-199. The FWS determined the GSG warrants federal listing as threatened across its range, but precluded listing based on other higher priority listing actions, 75 Fed. Reg. 13910 to 14014, Mar. 23, 2010; 75 Fed. Reg. 69222 to 69294, Nov. 10, 2010. The 2012 population viability analysis for the Northeast Wyoming GSG found

there remains a viable GSG population in the PRB (Taylor et al. 2012). However, threats from energy development and West Nile Virus are impacting future viability, Taylor, et al. 2012. The BLM IM WY-2012-019 establishes interim management policies for proposed activities on BLM-administered lands, including federal mineral estate, until RMP updates are complete. BLM Washington Office (WO) IMs 2012-43 and 44 add further management policies. Wyoming identified core areas (preliminary priority habitat) that include nesting or breeding grounds. The nearest designated core area (Thunder Basin) is 17 miles east of the Longbow Project Area. There are no GSG leks in the proposal area. One lek (Lek #59) is about 1.6 miles west, north-west from nearest proposed project disturbance (Longbow 05-30H, access road) (HWA 2012). Biologists detected no GSG signs at or near this lek during 2011 or 2012 surveys (HWA 2012). There were no other leks discovered during aerial surveys in 2 miles of the project area (HWA 2012). The analysis area is dominated by shortgrass prairie and lacks known patches of highly suitable habitats that may support nesting, brood rearing, or winter survival. GSG occurrence in the area is possible, based on the known species distribution, the existence of one known lek (inactive) within 2 miles of the project area, and the limited occurrence of sagebrush. However, such occurrence, if at all, is expected to be limited to a few individuals and for relatively short periods, as supported by the lack of detection during recent surveys, and the absence of observed GSG sign in the proposal area.

3.8.4.2. 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; Department Manual 235.1.1A and BLM Manual 6840. Appendix A, Table A, lists the BFO SSS and brief descriptions of typical habitats and an evaluation of potential impacts for each SSS. This table also indicates which SSS were selected for analysis in this EA. Wyoming BLM annually updates its list of SSS to focus management to maintain habitats to preclude listing as a threatened or endangered species. BLM Manual 6840.22A reads that "The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures that are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary." The PRB FEIS discusses impacts to sensitive species, pp. 4-257 to 4-265. 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 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 impacted beyond the level analyzed in the PRB FEIS, below.

3.8.4.2.1. Bald Eagle

The PRB FEIS discussed the affected environment for the Bald Eagle, p. 3-175. The Bald Eagle was a threatened species under the ESA when the BLM approved the PRB FEIS. FWS removed the Bald Eagle from the endangered species list in 2007. The Bald and Golden Eagle Protection Act (BGEPA) and the MBTA protect the eagle. No suitable nesting or roosting habitats exist in the proposal area (HWA 2012). Based on the results of recent winter surveys, the Bald Eagle occupies the vicinity of the proposal area during the winter (presumably foraging for terrestrial prey and carrion or roosting) (HWA 2012). The nearest Bald Eagle winter roost is 8 miles south southwest of the proposal area (HWA 2012).

3.8.4.2.2. Ferruginous Hawk

The PRB FEIS discussed the affected environment for the Ferruginous Hawk, p. 3-183. This species is widely distributed; however, its population status and trends are unknown but are suspected to be stable.

Populations are experiencing habitat loss, and they are sensitive to human disturbance. This hawk inhabits grasslands and sage shrublands in the PRB. This species typically nests on the ground, increasing its exposure to ground predators. The proposal area includes suitable nesting and foraging habitats. One active and 24 inactive/historical nests exist in the area and the associated 0.5-mile buffer surrounding the area (HWA 2012). The active Ferruginous Hawk nest (BLM Nest ID #5482) is near the northern boundary of the project area, and approximately 1 mile from the nearest proposed well pad.

3.8.4.2.3. Mountain Plover

The PRB FEIS discussed the affected environment for the Mountain Plover, pp. 3-177 to 3-178. The FWS proposed the Mountain Plover as a threatened species when BLM approved the PRB FEIS. Since then the FWS withdrew the proposal. BLM identified no suitable habitat in the project area in 2010, 2011, and 2012 surveys. One patch of potentially suitable habitat is 1.5 miles south of the project area (HWA 2012). The Mountain Plover was not detected in the project area during 2012 surveys (HWA 2012).

3.8.4.2.4. Western Burrowing Owl

The PRB FEIS discussed the affected environment for the Western Burrowing Owl (Burrowing Owl), p. 3-186. No Burrowing Owls were detected in the project area during 2012 surveys. The Burrowing Owl is not likely to occur in the project area based on the absence of prairie dog colonies and detections.

3.9. Aquatics

The PRB FEIS discussed the aquatic ecosystem and fishery, pp. 3-153 to 3-166. The project area occupies portions of three watersheds: Upper and Lower Porcupine, and Horse – Antelope Creeks (See AR). Black Butte and Porcupine Creeks are prominent ephemeral drainages in the Longbow Project Area. While several other smaller creeks and drainages occur in the project area, most of these water features are ephemeral and highly influenced by seasonal or periodic precipitation events. The proposed project facilities are in upland grassland habitats. Onsite water storage is proposed as part of the project and liquids associated with the project would be controlled and monitored.

3.10. Cultural Resources

A previously reviewed and accepted Class III cultural resource inventory covered portions of the project (BFO project #70030077). For the remaining portions Class III cultural resource inventories 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 were provided by EOG. (BFO project #'s 70120071, 70130016). Clint Crago, BLM Archaeologist, reviewed the reports for technical adequacy and compliance with BLM standards, and determined them to be adequate. The following resources are in or near the project area, Table 3.6.

Table 3.6. Cultural Resources Identified In or Near the Project Area

Site Number	Site Type	Eligibility
48CA369	Prehistoric Lithic Scatter	Not Eligible
48CA4493	Historic Debris Scatter	Not Eligible

4. ENVIRONMENTAL EFFECTS

Alternative A - No Action Alternative

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; 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 60 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 525 approved single and multi-well pads 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.

4.1. Air Quality

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

4.2. Soils and Vegetation

4.2.1. Direct and Indirect Effects

The PRB FEIS analyzed direct and indirect impacts to soils associated with fluid mineral development, pp. 4-134. Anticipated impacts occurring include soil rutting and mixing, compaction, increased erosion potential, and loss of soil productivity. The most notable impacts would occur in association with the construction of well pads, staging areas, and roads. Construction of these facilities requires grading and leveling, with the greatest level of effort required on more steeply sloping areas. Construction activities mix the soil profiles with a corresponding loss of soil structure. Mixing may result in removal, dilution, or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Less desirable inorganic compounds such as carbonates, salts, or weathered materials could be relocated and have a negative impact on revegetation.

Soils compaction results from the construction of wells and associated facilities, continued vehicle and foot traffic as well as operational activities. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction leads to a loss of soil structure; decreased infiltration, permeability, and soil aeration; as well as increased runoff and erosion. Increased erosion can lead to a decrease in soil fertility and an increase in sedimentation. The duration and intensity of these impacts would vary according to the type of construction activity to be completed and the inherent characteristics of the soils to be impacted. The potential for erosion would increase through the loss of vegetation cover and soil structure as compared to an undisturbed state. Soil productivity would decrease, primarily as a result of profile mixing and compaction along with the loss in vegetative cover. These impacts would begin immediately as the soils would be subjected to grading and construction activities and impacts would continue for the term of operations. The impacts on soils would move to a steady state as construction activities were completed and well production/maintenance operations begin.

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

Rutting affects the surface hydrology of a site as well as the rooting environment. The process of rutting physically severs roots, thus reducing soil aeration and infiltration thereby degrading the rooting environment. Rutting may result in topsoil and subsoil mixing, thereby reducing soil productivity. Rutting also disrupts natural surface water hydrology by diverting and concentrating water flow thus accelerating erosion. Soil mixing typically results in a decrease in soil fertility and a disruption of soil structure.
EOG proposed engineered sections of road to access the wells due to steep slopes, with cuts/fills exceeding 5 feet. EOG is responsible for having a licensed professional engineer certify that the construction of those roads meets the design criteria and is built to BLM Gold Book Standards. These engineered road segments should be built, including culverts, low water crossings and required surfacing, before the drilling rig or other drilling equipment moves onto the pad in order to protect erodible soils.

Low water crossings (LWC) are a BLM approved construction technique to allow all weather access though drainages where culverts are not appropriate or desired. BLM recommends specific design criteria for a typical LWC, which must be shown in proposed road designs. Construction completed to BLM approvable standards would reduce down drainage sedimentation, erosion, and scouring caused by frequent failure of in-channel structures.

EOG and BLM recommended a loamy and clayey ecological site seed mix for this project based on soil map unit types, the area's dominant ecological sites, and mixing of soil horizons in disturbances. The BLM would evaluate reclamation success using the requirements in the BLM State Wide Reclamation Policy found at: http://www.blm.gov/wy/st/en/programs/reclamation .

Expanded gas, water, and electric ROW infrastructure linking well field support facilities are part of reasonably foreseeable development (RFD) additions to the proposed action (PRB ROD, p. 2). A foreseeable addition may be a request for a ROW to connect roads, gas, electrical, and water utility lines.

Sandy ecological sites that are susceptible to wind erosion are scattered through the project area (map symbols 115, 157, 158, and 221). One section of the access road to pad #255 crosses a sandy ecological site. This area would be stabilized and reclaimed, per EOG's MSUP All other areas would be avoided during pad and access road disturbance activities; therefore, there would be no impacts to these soils.

4.2.2. Cumulative Effects

The PRB FEIS defines the designation of the duration of disturbance and addressed cumulative effects, pp. 4-1 and 4-151. Most soil disturbances would be short term impacts with expedient interim reclamation and site stabilization.

4.2.3. Mitigation Measures

BLM sees no impacts to LRP soils due to project design so it recommends no mitigation to LRP soils. The following mitigation will reduce impacts to other soils and vegetation from surface disturbance:

- For safety of travel, to reduce rutting and increase traction, place a minimum average of 4 inches of aggregate on road segments where grades exceed 8%.
- To protect erodible soils, all engineered road segments should be complete, including culverts, low water crossings and surfacing, before the drilling rig or other drilling equipment moves onto the pad.
- A licensed professional engineer should certify that the construction of engineered roads meet the design criteria and are built to Bureau standards.

Culverts would be at the appropriate locations for streams and channels crossed by roads specified in the BLM Manual 9112, Bridges and Major Culverts and Manual 9113, Roads. Streams would be perpendicular to flow, where possible, and all design of stream crossing structures would carry the 25-year discharge event or other capacities as directed by the BLM. Roads and other linear features should be mitigated through designs meeting the 9113 Manual requirements and completing construction, including surfacing, before drilling activity begins. These requirements, in the form of COAs or recommended

mitigation measures (RMMs), as discussed at the onsite investigation. EOG committed in their MSUPs to stabilize measures all locations, roads, etc., within 30 days of initiation of construction activities.

4.2.4. Residual Effects

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

Residual effects associated with the approval of proposed wells # 07-32H and # 200-32H are:

1. The area that would be impacted by the proposed wells includes open range. The majority of the access to this well pad is via an existing two-track road that would not require disturbance.
2. BLM also considered the following factors when considering the evaluation of proposed wells # 07-32H & # 200-32H: the majority of the access road to well # 07-32H & # 200-32H followed an existing two-track ranch road which would be stabilized by the proposal.

Residual effects from the approval of Longbow wells # 05-30H, 06-30H, 203-30H and 204-30H are:

1. The area impacted by the proposed wells # 05-30H, 06-30H, 203-30H and 204-30H includes an unnamed drainage. This drainage, upstream from Black Butte Creek, is relatively broad bottomed and well vegetated. Sediment that does reach the drainage bottom should be kept in check by relatively stable grassy bottoms.
2. BLM considered the following factor when considering the evaluation of proposed Longbow wells # 05-30H, 06-30H, 203-30H and 204-30H: the majority of the access road to wells # 05-30H, 06-30H, 203-30H and 204-30H followed an existing road which would be stabilized by the proposal.

Residual effects from the approval of the proposed Longbow wells # 03-2821H and 208-28H are:

1. An area impacted by the proposed wells includes open range. The majority of this pad's access is via county roads, Matheson Road, and an existing two-track that would not require disturbance.
2. BLM also considered the following factor when considering the evaluation of proposed Longbow wells # 03-2821H, and 208-28H: the majority of the access road to wells # 03-2821H, and 208-28H followed, existing roads and a two-track road that would be stabilized by the proposal.

Residual effects associated with the approval of proposed Longbow wells # 10-32H and 202-32H are:

1. The area impacted by proposed wells includes open range. The majority of the access to this well pad is via county roads and an existing two-track road that would not require disturbance.
2. BLM also considered the following factor when considering the evaluation of proposed wells Longbow wells # 10-32H & 202-32H: 1) The majority of the access road to wells # 10-32H & 202-32H followed an existing road that would be stabilized by the proposal.

Residual effects associated with the approval of proposed Longbow wells # 09-30H and 205-30H are:

1. The area impacted by proposed wells # 09-30H and 205-30H includes one unnamed drainage to Black Butte Creek. The section of unnamed drainage, upstream from the Black Butte Creek, is relatively broad bottomed and well vegetated. Sediment that does reach the drainage bottom should be kept in check by relatively stable grassy bottoms.
2. BLM also considered the following factor when considering the evaluation of proposed Longbow wells # 09-30H & 205-30H: the majority of the access road to wells # 09-30H and 205-30H followed an existing road that would be stabilized by the proposal.

In spite of the above residual effects, the BLM considers that Alternative B is within the parameters described for surface disturbance and surface disturbance reclamation in the PRB FEIS ROD.

4.3. Vegetation and Ecological Sites

4.3.1. Direct and Indirect Effects

The PRB FEIS discusses direct and indirect effects to ecological sites and vegetation, pp. 4-153 to 4-164. The proposal would impact the common plant communities that occur on the site and the transition between the communities. Other impacts anticipated to occur include those in the direct and indirect effects listed above under soils section. Direct effects to ecological sites would occur from ground disturbance caused by construction of well pads, ancillary facilities, and roads. Short-term effects would occur where vegetated areas are disturbed but later reclaimed within 1 to 3 years of the initial disturbance. Long-term effects would occur where well pads, roads, or other semi-permanent facilities would result in loss of vegetation and prevent reclamation for the life of the project.

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

Approximately 38 acres of native vegetation would be removed or disturbed by the proposal. Applicant-committed BMPs to implement interim reclamation and drill multiple wells from a single well pad would reduce the long-term impacts to vegetation in the project area. Grasses and forbs are expected to re-establish within a few growing seasons after reclamation, while woody species, such as sagebrush, would take several years to return. Reclaimed areas would be fenced to prevent grazing by livestock and wildlife while vegetation re-establishes.

Impacts to soil resources within the proposed project area are directly related to the amount of surface disturbances resulting from the proposed action. Direct soil impacts include soil horizon disturbances to the E, A1, A2, and upper B horizons resulting from site clearing, cut and fills, and location and access road grading. Secondary impacts to soils include loss of soils to wind, rain, and other erosive forces following horizon disturbances. Some soil erosion is expected to occur due to exposed soils on the proposed well pads and access roads required for construction. For well pad and access road construction, a minimum of 4 inches of topsoil would be stripped from the E and A horizons in each respective footprint and temporarily stored along the sides of the road or per well pad layout to provide access to the subsoils found in the lower B horizon. Implementation of BMPs such as installation and maintenance of straw wattles at the toe of disturbance slopes in or near drainage features, dust suppression on roads, interim reclamation measures, and erosion diversion wings/wattles in roadside ditches by the operator is projected to reduce and maintain negligible levels of erosion throughout the project area.

Reclamation potential for the soil complexes varies by soil series and may need soil amendments to achieve successful reclamation due to the thin layer of organic and biological material available in some of the soils. During interim reclamation, the salvaged topsoil would be spread on the back slopes in preparation for seeding. Areas not needed for the production phase would be reseeded once drilling is complete, or stabilized within 6 months if no drilling takes place. Seeding would be conducted during the optimal seeding window of early to late fall. Additional seeding would be conducted during the early spring months following interim stabilization. Once production ceases, final reclamation would begin by regrading the pad to the original contours and redistributing topsoil. The entire disturbed area, including the former access roads and well pad, would be reseeded with the seed mixture specified in the COAs. The proponent would implement BMPs related to the reclamation effort and conduct all surface activities, including reclamation activities, in accordance with the BLM Gold Book (BLM and USFS 2007).

4.3.2. Cumulative Effects

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

4.3.3. Mitigation Measures

All fill material is to be placed in shallow lifts (6 to 12 inches), moisture applied, and compacted to a 95% maximum standard density as determined by AASHTO T-99. Temporarily fence reseeded areas for at least 2 complete growing seasons to ensure reclamation success on problematic sites (e.g., close to livestock watering source, erosive soils, etc.). Grading and site preparation BMPs and other soil retention measures would mitigate for potential soil losses and other erosive forces. Topsoil segregation would occur at the proposed well pads to be used during future pad reclamations and project restorations, thereby mitigating impacts to soils at the proposed locations. Implementation of the mitigation measures in the COAs or RMMs, Longbow POD, and its associated plans including the Integrated Weed and Pest Management Plan, the WMP, and the MSUP would reduce surface disturbance impacts to ecological sites and vegetation. See the administrative record for some of these documents.

BLM selected seed mixes containing native grasses and forbs that could restore disturbed areas to functioning vegetation communities, with the exception of sage-brush since it's not in the current seed mixes. BLM offers the same protections to privately owned surfaces that are disturbed as a result of federal mineral development as those surfaces administered by the BLM, therefore BLM developed a site specific seed mix for the access corridors for the proposal. All sandy ecological sites are outside of the disturbance areas. The surface owner may select the seed mix for private land that may be more beneficial for grazing. EOG would follow the proposed Reclamation Plan and adapt to changing conditions and technologies. Description of the reclamation approach is provided in the Site-Specific Surface Use Plan.

4.3.4. Residual Effects

Residual effects were also identified in the PRB FEIS, pp. 4-408 such as the loss of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established. 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. The proposed wells and access roads would not be located in LRP areas or locations with steep slopes. Residual effects include: surface vegetation would be impacted during construction. This would likely result in an increase in soil erosion into surrounding ecosystems. This increased erosion would affect stability and functionality of these sites. However, cuts and fills proposed at the proposed pads would be exposed for only a short period; with timely (within 30 days) stabilization measures applied and strict adherence to reclamation guidelines. BLM considers that these residual effects from Alternative B are within the parameters for surface disturbance and its reclamation in PRB FEIS ROD and Onshore Oil and Gas Order Number 1.

4.4. Water Resources

Adherence to the drilling COAs, 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 drilling and completion plans and Onshore Oil and Gas Orders Nos. 2 and 7 would ensure there is no adverse impact on ground water. The volume of water produced by this federal mineral development is at the time of permitting. EOG would have to produce each well for a time to be able to estimate the volume and quantity of water production. To comply with Onshore Order Oil and Gas Order No. 7 Disposal of Produced Water, EOG would submit a Sundry to the BLM within 90 days of first production, which includes a representative water analysis and the final proposal for water management. 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. There are 3 common alternatives for water

management: re-injection, deep disposal, or disposal into pits. All alternatives would be protective of groundwater resources when performed in compliance with state and federal regulations.

Water quality of hydraulic fracturing flowback water, Onshore Oil and Gas Order No. 7, Disposal of Produced Water, regulates produced water. The 2003 PRB ROD and FEIS extensively analyzed the surface discharge of produced water. The produced water from a typical oil well is ineligible for surface discharge and is disposed of in lined pits or at permitted injection facilities. The WDEQ and WOGCC regulate waters and chemicals for drilling. "BLM may rely on the actions of state regulators. The IBLA 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 Eng'rs, 351 F. Supages 2d 1232, 1244 (D. Wyo. 2005); PRBRC, 180 IBLA 32, 57 (2010); Bristlecone Alliance, 179 IBLA 51, 74-77 (2010)." In 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.

4.4.1. Groundwater

4.4.1.1. Direct and Indirect Effects

EOG proposes obtaining water for hydraulic fracturing and dust abatement from multiple sources, refer to sections 2.2.3 and 2.2.4. There would be no permanent on-site storage excluding water and oil tanks, so mixing would occur at the pad in the down-hole stream. EOG would manage flow back water from the hydraulic fracturing through above ground tanks and hauled to a WDEQ authorized facility. Based on the depth of the proposed well bores, minimal domestic or agricultural wells in the area, and well casing requirements, no direct impacts to groundwater would result from the proposed action. Indirect impacts to groundwater resources potentially could occur if significant dewatering and other large-volume groundwater removal occur during well operations and production. Possible contamination effects of freshwater aquifers would be reduced through the use of tested casing, by setting casing at appropriate depths and by following safe repair procedures in the event of casing failure. Additionally the cumulative industry and regulatory experience shows that thousands of wells pierce the nation's largest aquifer in western Texas, Oklahoma, and Kansas with essentially no direct or indirect impact to that groundwater (http://www.spe.org/jpt/print/archives/2010/12/10Hydraulic.pdf). Lastly, the 2004 EPA study, and its on-going detailed study of hydraulic fracturing, has not demonstrated, thus far, any immediate issues, concerns, or warnings regarding the current industry and regulatory practices endangering ground water that would require immediate changes.

4.4.1.2. Cumulative Effects

Implementation of the project would not contribute to cumulative effects.

4.4.1.3. Mitigation Measures

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

4.4.1.4. Residual Effects

BLM anticipates no residual effects.

4.4.2. Surface Water

4.4.2.1. Direct and Indirect Effects

BLM expects no impacts to springs from the proposed action. The access roads that would be constructed across Black Butte Creek and its tributary would be maintained as necessary to prevent soil erosion and accommodate all-weather traffic. Culverts would be sized and installed so that surface flows are not impeded. The roads would be crowned, ditched and surfaced with water turnouts installed as necessary to provide for proper drainage along the access road routes and in accordance EOG's Storm Water Management Plan. Slight increases in sedimentation may occur in Black Butte Creek, though they would be minor with implementation of the mitigation, below.

4.4.2.2. Cumulative Effects

Implementation of the project would not contribute to cumulative effects.

4.4.2.3. Mitigation Measures

Channel crossings by roads should be constructed perpendicular to flow. Culverts should be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112, Bridges and Major Culverts and Manual 9113, Roads. Streams would be crossed perpendicular to flow, where possible, and all stream crossing structures should be designed to carry the 25-year discharge event or other capacities as directed by the BLM. No active springs were identified within a one mile radius of a proposed well pad therefore no water sampling would be required.

4.4.2.4. Residual Effects

BLM anticipates no residual effects.

4.5. Minerals – Leasables; Locatables; Salables

There are no known or projected conflicts from other mineral rights in the project area.

4.6. Wetland/Riparian

4.6.1. Direct and Indirect Effects

There are at least 37 potentially jurisdictional wetlands in the project area. Watershed values, including natural drainages, would not be adversely impacted by this proposal based on the inclusion of effective design criteria and avoidance practices. Other water resources would not be adversely impacted by implementing the proposal. Other downhole well operations, implemented using standard engineering practices, would likely have little to no measurable impacts to wetlands and riparian areas. Disturbance associated with streambed crossing should be restricted to the smallest feasible disturbance. Minor direct impacts would occur from the construction of two access roads at the crossing of Black Butte Creek and one of its tributaries to access well pads 51 and 255. At these proposed crossings, appropriately-sized culverts should be installed. The discharge of fill material and wetland surface impacts in this area would be expected to be limited. Crossing construction would adhere to standard crossing BMPs. No other direct impacts to wetlands or riparian habitats are anticipated by the proposal.

Indirect impacts to wetlands and riparian areas would occur if erosion and sedimentation occurred, causing deposition in these down-gradient areas. Based on the avoidance of the majority of these types of habitats and implementation of operator-committed measures for stormwater management, indirect impacts to these resources would be unlikely. Additional measures, including installation of structural BMPs near the one road crossing of Black Butte Creek would further reduce the potential for indirect impacts to wetlands and riparian areas.

4.6.2. Cumulative Impacts

The cumulative impacts associated with implementation of this proposal, when considered with other existing and proposed development in the project area, would not be substantial. The application of

mitigation measures would ensure that the incremental impacts of implementation of the proposal, when considered with any existing development are insignificant. For more information on cumulative impacts, refer to the PRB FEIS.

4.6.3. Mitigation Measures

Wetland mitigation measures, including those described in the proposal, BMPs, and the Stormwater Management Plan are expected to be appropriate and effective.

4.6.4. Residual Effects

BLM anticipates no residual effects.

4.7. Invasive Species

4.7.1. Direct and Indirect Effects

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

- Control Methods, including frequency
- Preventative practices
- Education

Cheatgrass (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) exist in the project area, yet a control program is not feasible since they are widespread in Wyoming. Other species of concern include: leafy spurge, Canada thistle, common cocklebur, buffalo bur, spotted knapweed, and diffuse knapweed. The use of existing facilities and the surface disturbance associated with construction of proposed access roads and related facilities would present opportunities for weed invasion and spread. The activities related to the implementation of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as Canada thistle, and perennial pepperweed. However, mitigation as required by BLM applied COAs and RMMs, would reduce the likelihood and severity of establishing and spreading noxious weeds and invasive plants.

Surface disturbances associated with the implementation and construction of the proposed well sites and access roads would create conditions that may be suitable for the establishment and spread of invasive and noxious weeds. Direct impacts to native vegetation resulting from weed infestations in the project area may include the loss of wildlife habitat, reduced rangeland productivity, reduced native plant species diversity, increased wildfire frequency and severity. Indirect impacts resulting from weed infestations may include changes in the fire cycle as a result of the potential for cheatgrass proliferation on disturbed soils and increased costs from weed management efforts. Operator-committed measures would reduce the potential for the establishment and spread of invasive and noxious weeds on all disturbed areas. Such control measures would be in accordance with BLM, state, county, and other local regulatory agencies.

4.7.2. Cumulative Effects

Cumulative effects resulting from the potential establishment and spread of noxious and invasive weeds are discussed in the PRB FEIS, p. 4-171.

4.7.3. Mitigation Measures

Operator-committed measures would control invasive plants on all disturbed areas, and these control measures would be in accordance with BLM, state, county, and other local regulatory agencies.

4.7.4. Residual Effects

EOG's control efforts would be limited to the surface disturbance associated the project's construction and operation. Cheatgrass and other weeds that are present in non-physically disturbed areas of the project area are anticipated to continue to spread unless control efforts are expanded. Cheatgrass and to a lesser

extent, Japanese brome (*Bromus japonicus*) treatments are being made by BLM, USDA, WGFD and other partners at some small infestation areas; but for the most part, control programs are not considered feasible and these annual bromes would continue to be found in the project area.

4.8. Fish and Wildlife

4.8.1. Big Game

The PRB FEIS analyzed direct and indirect impacts to big game, pp. 4-181 to 4-210. As discussed in that document, impacts to pronghorn, mule deer, and white-tailed deer may occur through alterations in hunting and/or poaching, increased vehicle collisions, harassment and displacement, increased noise, increased dust, alterations in nutritional status and reproductive success, increased fragmentation, loss or degradation of habitats, reduction in habitat effectiveness, and declines in populations. Refer to the PRB FEIS for big game cumulative impacts, p. 4-211. BLM proposes no mitigation measures for big game under implementation of Alternative B. BLM anticipates no residual impacts.

4.8.2. Small Game (Birds and Mammals): Plains Sharp-tailed Grouse

The PRB FEIS analyzed the direct and indirect effects to the Plains Sharp-tailed Grouse, pp. 4-221 to 4-226. There are no project-specific direct or indirect effects because there is no suitable habitat and no known leks in the project area. The PRB FEIS analyzed the cumulative effects to the Plains Sharp-tailed Grouse, see above. BLM proposes no mitigation and anticipates no residual impacts.

4.8.3. Non-Game

4.8.3.1. Raptors

4.8.3.1.1. Direct and Indirect Effects

The PRB FEIS analyzed direct and indirect effects to raptors, pp. 4-216 to 4-221. This project would result in disturbance to raptors nesting in its vicinity, including possible disruption of normal behavior, direct loss of foraging habitats and indirect losses associated with declines in habitat effectiveness. All raptors using nests in the project's vicinity would likely be impacted to some extent by the human disturbance associated with operation and maintenance. Potential effects on active nests, including the active Ferruginous Hawk Nest (#5482) that is on the northern boundary of the proposal area, are similar to those described in the PRB FEIS, including disturbance of individuals, displacement of individuals from otherwise suitable habitats, and alteration or loss of suitable foraging habitats. Implementation of timing limitations would minimize the direct effects of the proposed project on nesting raptors. Indirect effects to this species as the result of alteration or loss of suitable foraging habitats are expected to be minor and insignificant considering the size of the proposed ground disturbance compared to the availability and suitability of other undisturbed foraging habitats in the vicinity of the disturbance.

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If 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. Prolonged disturbance can also lead to the abandonment of the nest by the adults. Routine human activities near these nests can also draw increased predation - resulting in increased nest predation. To reduce the risk of decreased productivity or nest failure, the BLM recommends a 0.5-mile radius timing limitation buffer during the breeding season around active raptor nests and recommends all infrastructures requiring human visitation be more than 0.5 miles from known active raptor nests to provide an adequate biological buffer for nesting raptors. A biological buffer is a combination of distance and visual screening providing nesting raptors with security such that they will not be flushed by routine activities. All proposed wells and associated infrastructure occurring within 0.5 miles of documented raptor nests are in Appendix B. Additionally, the U.S. Fish and Wildlife Service (FWS) was consulted and asked to provide their recommendations regarding minimizing impacts to nesting raptors. The FWS recommended a one-mile disturbance buffer for known active Ferruginous Hawk nests.

The BLM and EOG reduced impacts to nesting raptors by adjusting well and infrastructure placement. The following were changes made as a result of the onsite review:

- Well Pad 52 (Wells 03-2821H and 208-28H) was moved from Section 21 to Section 28 to avoid potential impacts to an active raptor nest (Hayden-Wing ID 204) in Black Butte Creek. This relocation also follows the recommendation made by the FWS toward reducing impacts to the known active FEHA nest in Section 21. There are no raptor nests within 0.5 mile of Well Pad 52 in Section 28.
- Well Pad 49 (Wells 07-32H and 200-32H) was narrowed on its north to avoid the drainage. Surveys conducted in 2012 found there are no active raptor nests with 0.5 mile of this well pad. Several inactive raptor nests were more than 0.5 miles north of this well pad. The final configuration of the aboveground facilities at this pad would be established toward reducing visual impacts to raptor nests that may be in the line of sight. Tank batteries may be used as effective visual screens.
- Well Pad 255 (Wells 09-30H and 205-30H) was relocated to the NENW quarter/quarter of Section 30 in an effort to provide more distance from known raptor nests located in the southern portions of Section 30 (HWA Nest ID #s 111, 112, 110, 112, 68, 106, 107, and 113). Placement of the tanks in the line of sight of these nests would reduce potential visual impacts to these inactive raptor nests. A BLM timing limitation stipulation is recommended for this well pad, see mitigation measures, below.
- Well Pad 51 (Wells 05-30H, 06-30H, 203-30H, and 204-30H) production tanks were moved to provide a visual screen from one inactive raptor nest (Hayden-Wing ID #112) that is within 0.5 mile to the northeast of this well. No other active or inactive nests were within 0.5 mile of this well. A BLM timing limitation stipulation should be applied to this well pad, see mitigation measures, below. EOG should employ the appropriate and typical practices to reduce potential impacts to these inactive nests, described above, including the placement of storage tanks in the line of sight of known raptor nests.

4.8.3.1.2. Cumulative Effects

The cumulative effects are within the analysis parameters described in the PRB FEIS, p. 4-221.

4.8.3.1.3. Mitigation Measures

BLM recommends a 0.5-mile radius timing limitation during the breeding season around active raptor nests to reduce the risk of decreased productivity or nest failure. This timing restriction, however, would not apply to completion activities or maintenance actions (for example, work over operations).

4.8.3.1.4. Residual Effects

Even with timing restrictions, raptors may abandon nests caused by foraging habitat alteration associated with development or sensitivity to well or infrastructure placement. Declines in breeding populations of some species that are more sensitive to human activities may occur. The timing restrictions analyzed in the PRB ROD can only be applied to planned or actual surface disturbing activities. These restrictions do not protect nesting raptors from human disturbance or maintenance actions (disruptive activity that can last from several days to weeks) associated with later phases of operations at well locations during breeding/nesting season. The potential for impacts associated with noise, additional traffic, human presence, and equipment disruption with maintenance actions from well operations would remain.

4.8.3.2. Migratory Birds

4.8.3.2.1. Direct and Indirect Effects

The PRB FEIS discussed the direct and indirect effect, pp. 4-231 to 4-235. Native habitats would be lost through the construction of wells, roads, and pipelines. Activities would likely displace migratory birds farther than the immediate area of physical disturbance. Ingelfinger (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.

4.8.3.2.2. Cumulative Effects

The cumulative effects are within the analysis parameters and impacts found in the PRB FEIS, p. 4-235.

4.8.3.2.3. Mitigation Measures

BLM proposes no timing limitations on surface disturbing activities specifically for migratory birds, because the habitat within and surrounding the proposed well pads is less than suitable for nesting pairs of several migratory bird species. The dominant vegetative within the proposed project is pasture grasses (<2 feet) with small patches of yucca, sagebrush, and bare ground. Raptor and GSG timing limitations on surface disturbing activities would serve to mitigate impacts to non-sensitive nesting migratory birds.

4.8.3.2.4. Residual Effects

Though no timing restrictions are typically applied specifically to protect migratory bird breeding or nesting, where BLM applies GSG or raptors nesting timing limitations, nesting migratory birds receive protection.

4.8.4. Threatened, Endangered, Candidate, and Special Status (Sensitive) Species

4.8.4.1. Threatened: Ute Ladies'-tresses Orchid (ULT)

Based on the lack of suitable habitat and lack of known occurrences in the project area, implementation of the proposal will have "no effect" on the ULT. The PRB FEIS discussed the cumulative effects, pp. 4-253 to 4-254. BLM proposes no mitigation with Alternative B and anticipates no residual effects.

4.8.4.2. Candidate: Greater Sage Grouse (GSG)

Implementation of Alternative B would not have substantial direct or indirect effects on the GSG. BLM bases this evaluation on the inactivity at all leks within 2 miles of the proposed project, the absence of GSG PPH in the proposal area, and the low likelihood individuals rely on habitats in the project area for critical periods of their life stage, including breeding, nesting, brood rearing, or wintering. The PRB FEIS discussed the cumulative effects on pp. 4-271 to 4-273. In order to reduce the likelihood that activities associated with noise, construction, and human disturbance, BLM will recommend a mitigation measure of a timing limitation on all surface-disturbing activities in GSG habitat (road to pad #51). The intent of this timing restriction is to decrease the likelihood that grouse will avoid these areas and increase habitat quality by reducing noise and human activities during the breeding season. A timing limitation does nothing to mitigate loss and fragmentation of habitat or changes in disease mechanisms. The residual effect is the suitability of the project area for GSG will be negatively affected as the result of habitat loss and fragmentation and proximity of human activities associated with fluid mineral development.

4.8.4.3. Special Status (Sensitive) Species

4.8.4.3.1. Bald Eagle

The PRB FEIS discussed the direct and indirect impacts to the Bald Eagle, pp. 4-251 to 4-253. No active nests would be impacted by the proposed project because none are known to occur in the vicinity. Based on the known occurrence of wintering Bald Eagles in the project vicinity, project-related human presence and activity has the potential to disturb or displace wintering Bald Eagles, particularly foraging eagles. The PRB FEIS discussed the cumulative effects, pp. 4-251 to 4-253. In addition to federal oil and gas development impacting the Bald Eagle, there is fee development associated with the project that has similar impacts on this species. Livestock grazing also occurs in the area, which may provide some of the prey base for wintering Bald Eagles. Based on the existing and expected Bald Eagle occurrence in the project area (primarily as winter foraging), BLM proposed no mitigation for this species. However, if occurrence patterns, including nesting or winter roosting are observed, appropriate timing limitations would be recommended. Residual effects include but are not limited to: habitat alterations, including

effects on wintering habitats that are not subjected to typical nesting and roosting timing limitations, may continue from federal and fee projects. Over time such effects may eventually reach a level that impacts that effectiveness of these habitats and possibly resulting in violations of the MBTA or BGEPA. Considering the efforts to avoid and minimize effects to migratory birds and eagles, including adjustments of pad facilities to provide visual barriers, scheduling routine activities outside of the nesting period, and implementation of appropriate timing limitations, effects on these species are expected to be unlikely and lacking in intensity or duration to cause adverse effects on individuals or populations.

4.8.4.3.2. Ferruginous Hawk

The PRB FEIS discussed the direct and indirect effects, p. 4-262. Implementing Alternative B would have the potential to cause similar direct and indirect effects on the active Ferruginous Hawk nest that is north of the proposal's northern border. The magnitude and duration of potential effects would be ameliorated with application of the 0.5-mile timing limitation stipulation to pad #s 51 and 255. The PRB FEIS discussed the cumulative effects, p. 4-273. BLM proposes no further mitigation for this species and anticipates no residual effects.

4.8.4.3.3. Mountain Plover

The PRB FEIS analyzed the direct and indirect impacts, pp. 4-254 to 4-255. Based on the lack of known suitable habitat and the absence of observed Mountain Plovers in the project area during recent surveys (HWA 2012), the proposal would not impact this species. The PRB FEIS analyzed the cumulative effects, p. 4-273. No cumulative effects are anticipated for this species. BFO will recommend a 0.25 mile timing limitation on surface-disturbing activities for potential nesting habitat during the nesting season to reduce impacts to nesting mountain plovers. BLM anticipates no residual effects on this species.

4.8.4.3.4. Western Burrowing Owl

The PRB FEIS discussed direct and indirect effects on the Western Burrowing Owl, p. 4-262. The PRB FEIS discussed impacts to this species, p. 4-273. In addition to the federal development, there will be fee development associated with the project that will have similar impacts on Western Burrowing Owls as those discussed in the PRB FEIS. Practices such as poisoning or shooting of prairie dogs or other intentional methods of extermination can potentially affect Western Burrowing Owl productivity through a reduction in nest site availability. Based on no known Western Burrowing Owl nests in the project area, the BLM proposes no mitigation under implementation of Alternative B. If nesting status changes in the project area, BLM would propose a 0.25-mile timing limitation buffer zone on surface disturbing activities for Western Burrowing Owl nest locations during the nesting season (April 15 to August 31). The residual effect is that wells, pipelines, and roads that are built in prairie dog colonies will directly impact nesting habitat for the Western Burrowing Owl and may reduce the quality of adjacent habitats for this species, regardless of the timing of their construction.

4.9. Aquatics

The project, being semi-closed loop, has no direct and indirect effects. There is no direct discharge under Alternative B. Onsite and managed containment tanks will receive produced liquids – minimizing West Nile virus proliferation. The PRB FEIS discussed cumulative effects, pp. 4-247 to 4-249. BLM proposes no mitigation measures under implementation of Alternative B and anticipates no residual impacts.

4.10. Cultural Resources

4.10.1. Direct and Indirect Effect

Non-eligible site 48CA369 may be impacted by the proposed project. No historic properties would be impacted by the proposed project. Following the Wyoming State Protocol Section VI(A)(1), the BLM electronically notified the Wyoming State Historic Preservation Officer (SHPO) on January 18, 2013 that no historic properties exist in the area of potential effect.

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

4.10.3. Mitigation Measures

If Operators observe any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS and ROD)] during operation of this lease/permit/right-of-way, they would be left intact and the Buffalo Field Manager notified. Standard COA (General)(A)(1) further explains discovery procedures.

4.10.4. Residual Effects

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

4.11. Transportation and Access

4.11.1. Direct and Indirect Effects

Existing access consists of gravel county roads and two-tracks. Access roads would be constructed as identified in the attached MSUP. Drilling of each well on a pad would consist of 295 truck trips for drilling operations and 366 truck trips for completion operations. Types of trucks include workover rigs, water trucks, water tanks, sand haulers fuel, hot oil and heavy equipment associated with pad construction. Small truck traffic would include three truck trips a day for drilling and 2 truck trips for completion activities. Dust suppression would be needed along County Road 30, Matheson Road, and Reno Douglas Road in addition to some of the access roads to the well locations. Dust suppression would include water and potentially magnesium chloride or other approved methods.

Transportation in the project area would be affected on a long-term basis. The proposed development would increase the average daily traffic (ADT) on all of the roads in the EA boundary for the duration of well production. Well lifespan is anticipated to be 10 to 40 years. During this period both the proposed and existing roads would have accelerated erosion and sedimentation, increased dust, dust abatement,

higher noise levels, and additional traffic increasing accident potential. The roads would be used by the local ranchers, oil and gas personnel, federal government personnel, and to a lesser extent, the general public for recreational purposes. Long term impacts would be if the private land owners wish to keep the roads when the wells are no longer in production for their ranching operation.

4.11.2. Cumulative Effects

Conditions of existing roads in the project area are highly variable. Roads generally are unpaved, and are built of native soils rated as marginal construction material. Mobilization of drilling and construction equipment relies on semi-trucks with trailers designed for use on paved roads and highways. The gross vehicle weight of these combination vehicles often exceeds 80,000 pounds with drilling rigs exceeding 100,000 pounds. There is concern that the use of these vehicles, especially when loaded, on roads not completely constructed contributes to a higher than average potential for motor-vehicle accidents.

4.11.3. Mitigation Measures

All constructed roads would be completed, including any culverts, low water crossings and required surfacing, before the drilling rig or other drilling equipment moves onto the pad. The entire access road would be surfaced with an average of 3 inch minus gravel. The BLM recommends crushed aggregate of Gradation "W" as outlined in the WY Highway Department specifications for road and bridge construction per the BLM Manual Supplement WYSO for 9113 but, on split estate, BLM will consider the private surface owners' preference. The operator is responsible for having a licensed professional engineer certify that the actual construction of the road meets the design criteria and is constructed to BLM standards. BLM should apply a COA that requires the operator to provide for construction oversight of all engineered roads and well pads. In addition, the operator should be required to contact the BLM at least 4-days prior to construction of engineered sections of the POD to provide BLM the opportunity to complete onsite construction inspection. EOG may mitigate excessive dust with water or other treatments.

4.11.4. Residual Effects

Transportation use along the roads would be converted either for the duration of the well operation to primarily oil and gas use. During this timeframe, the road network would experience all weather use with an ADT of 2-20 vehicles. This is in excess of seasonal fair-weather use of primitive roads for livestock operations and recreational use. Additional traffic, risks of accidents, and indirect effects would be proportionate to the number of employees and activates for each year of the project. If roads are constructed as proposed, stabilized, and well maintained the residual effects associated with road high traffic us should be minimal.

5. CONSULTATION AND COORDINATION

BLM consulted or coordinated with the following on this project:

Contact	Organization	Onsite Presence?	Contact	Organization	Onsite Presence?
Kaylene Gardner	EOG	Y	Michelle Robles	EOG	Y
Jennifer Yu	EOG	Y	Nick Mathis	Heritage Env Consulting	Y
Clint Goodman	EOG	Y	Pat Golden	Heritage Env Consulting	Y
Steve Bennett	EOG	Y	Mary Hopkins	WY State Historical Officer	N
Michelle Robles	EOG	Y			

List of Preparers (BFO unless otherwise noted)

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Petroleum Engineer	Matt Warrren	Geologist	Kerry Aggen

Position/Organization	Name	Position/Organization	Name
NEPA Coordinator	John Kelley	Supervisory NRS	Kathy Brus
Assistant Field Manager	Chris Durham	Assistant Field Manager	Clark Bennett

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Appendix A. BLM BFO Evaluation of Sensitive Species and Selection for Analysis

Table A: BLM BFO Evaluation of Sensitive Species and Selection for Analysis

Common Name (Scientific name)	Habitat	Presence	Potential Effects	Rationale/Analyzed
Amphibians				
Northern leopard frog (*Rana pipiens*)	Aquatic and emergent vegetation habitats (ponds and cattail marshes).	NP	NI	No suitable habitat and occurrence unlikely. Not analyzed.
Columbia spotted frog (*Rana luteieventris*)	Aquatic and emergent vegetation habitats in foothill and montane zones.	NP	NI	No suitable habitat and occurrence unlikely. Not analyzed.
Fish				
Yellowstone cutthroat trout (*Oncorhyrnchus clarkii bouvieri*)	Cold-water rivers, streams, & beaver ponds; in Upper Tongue watershed.	NP	NI	No suitable habitat and occurrence unlikely. Not analyzed.
Birds				
Trumpeter Swan (*Cygnus buccinators*)	Quiet, clear, ponded waters. In Wyoming, typically known from northwestern (Yellowstone) and far eastern corners (Black Hills)	NP	NI	No suitable habitat and occurrence unlikely. Not analyzed.
White-faced Ibis (*Plegadis chihi*)	Breeding habitat includes shallow marshes with islands of emergent vegetation. In WY, often found in southwestern & southeastern WY.	NP	NI	No suitable habitat and occurrence unlikely. Not analyzed.
Northern Goshawk (*Accipiter gentilis*)	Old growth forest obligate.	NP	NI	No suitable habitat and occurrence unlikely. Not analyzed.
Bald Eagle (*Haliaeetus leucocephalus*)	Associated with a variety of habitats, including mature riparian (nesting and winter roosting) and open habitats for foraging (typically winter)	NS	MIIH	Individual eagles may occur while foraging for terrestrial prey or carrion. Nesting and winter roosting not suspected in Project Area (HWA 2012). Analyzed based on potential to disturb suitable foraging habitats. Analyzed.
Ferruginous Hawk (*Buteo regalis*)	Typically nests in arid and open landscapes, including grasslands, shrubsteppe, and cold deserts. Occurs & nests within 0.5 miles of the proposal.	K	MIIH	Known to occur within 0.5 mile of the Project Area. Analyzed.

Table A: BLM BFO Evaluation of Sensitive Species and Selection for Analysis

Common Name (Scientific name)	Habitat	Presence	Potential Effects	Rationale/Analyzed
Peregrine Falcon (*Falco peregrinus*)	Typically nests on cliffs, near water and associated with open terrestrial habitats. In Wyoming, most commonly nests in the western half of the state.	NS	NI	No suitable nesting habitat. Foraging and migrating occurrence considered highly limited (duration and frequency). Not analyzed.
Greater Sage-Grouse (*Centrocercus urophasianus*)	Sagebrush obligate. Relying on sagebrush communities throughout the year, with varying reliance on adjacent grassland and shrubland habitats for foraging and cover.	S	MIIH	One lek (#59, HWA 2012) known within 2 miles of the Project Area. No birds observed at this lek or in the Project Area during 2012 surveys (HWA 2012). Analyzed.
Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*)	Relies on grasslands and shrublands associated with gently sloping terrains.	NP	NI	No suitable habitat . Occurrence unlikely. Surveys conducted in 2012 did not identify leks or individuals. Not analyzed.
Mountain Plover (*Charadrius montanus*)	Occurs & nests in grasslands, those associated with vegetation that is relatively shorter than surrounding vegetation (i.e., prairie dog colonies).	NS	MIIH	Surveys conducted in 2010 and 2011 did not indicate highly suitable habitat in the project and no individuals were detected. Individuals may occur in the Project Area. Analyzed.
Long-billed Curlew (*Numenius americanus*)	Typically nests in prairie & grassy (short-grass & mixed-grass) habitats, often associated with water. Found throughout WY, except forested habitats.	NP	NI	Species not expected to occur in the Project Area based on the absence of persistent water and their association with grassland habitats near aquatic areas. Not analyzed.
Yellow-billed Cuckoo (*Coccyzus americanus*)	Associated with thick & dense deciduous vegetation with undergrowth.	NP	NI	No suitable habitat and occurrence unlikely. Not analyzed.
Burrowing Owl (*Athene cunicularia*)	Associated with dry, treeless habitats (grasslands, shrublands, and deserts) with a high density of burrows (especially prairie dog colonies).	NS	MIIH	Suitable grassland and shrubland habitat exists however, no prairie dog colonies exist in the Project Area. Surveys conducted in 2012 did not detect this species. Analyzed.
Sage Thrasher (*Oreoscoptes montanus*)	Nests throughout WY where suitable habitat exists. Sagebrush obligate, associated with sagebrush-steppe habitats with gentle slopes / rolling hills.	NS	NI	Habitat is dominated by grassland habitat, with limited and isolated patches of sagebrush. Not analyzed.
Loggerhead Shrike (*Lanius ludovicianus*)	Basin prairie shrub & montane foothill shrub. Nesting in dense vegetation and foraging in more open habitats.	NP	NI	No suitable habitat and occurrence unlikely. Not analyzed.

Table A: BLM BFO Evaluation of Sensitive Species and Selection for Analysis

Common Name (Scientific name)	Habitat	Presence	Potential Effects	Rationale/Analyzed
Brewer's Sparrow (*Spizella breweri*)	A sagebrush obligate. In WY, nesting associated with sagebrush habitats.	S	MIIH	Species is common in suitable sagebrush habitats throughout Wyoming. Not analyzed.
Sage Sparrow (*Amphispiza belli*)	A sagebrush obligate, positively & highly correlated with large stands of dense & tall sagebrush; and negatively associated with open grassland.	NP	NI	No suitable habitat and occurrence unlikely. Not analyzed.
Baird's Sparrow (*Ammodramus bairdii*)	A grassland species, preferring lightly grazed habitats.	S	MIIH	Project activities may disturb suitable nesting grassland habitats. Not analyzed.
Mammals				
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	Requires caves and mines for roosting.	NP	NI	No suitable habitat in the Project Area. Not analyzed.
Spotted Bat (*Euderma maculatum*)	Forested and shrub habitats in central and southwestern Wyoming.	NP	NI	No suitable habitat in the Project Area; beyond the known range of this species. Not analyzed.
Long-eared Bat (*Myotis evotis*)	Roosts in caves and mines, and forages in conifer and deciduous forests.	NP	NI	No suitable habitat in the Project Area and beyond the known range of this species. Not analyzed.
Fringed Myotis (*Myotis thysanodes*)	Conifer forests, woodland chaparral; caves and mines.	NP	NI	No suitable habitat in the Project Area. Not analyzed.
Black-tailed Prairie Dog (*Cynomys ludovicianus*)	Prairie habitats (open grasslands and shrublands) with deep, firm soils, and slopes less than 10 degrees.	NS	NI	Surveys of the Project Area conducted in 2010, 2011, and 2012 did not locate prairie dog colonies or individuals. Not Analyzed.
Swift Fox (*Vulpes velox*)	Open grassland habitats.	S	MIIH	Suitable habitat exists in the Project Area. No swift fox or swift fox dens were observed in the proposal area (HWA 2012). Not analyzed.
Plants				
Porter's Sagebrush (*Artemisia porteri*)	Sparsely-vegetated badlands of ashy or tufaceous mudstone and clay slopes; elevation range 5300 – 6500 ft.	NP	NI	No suitable habitat in the Project Area. Not analyzed.
Williams' Wafer-parsnip (*Cymopterus williamsii*)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides; elevation 6000-8300 ft.	NP	NI	No suitable habitat in the Project Area. Not analyzed.

Table A: BLM BFO Evaluation of Sensitive Species and Selection for Analysis

Common Name (Scientific name)	Habitat	Presence	Potential Effects	Rationale/Analyzed
Limber Pine (*Pinus flexilis*)	Mountains associated with high elevation conifer species.	NP	NI	No suitable habitat in the Project Area. Not analyzed.

Presence	Project Effects
K – Known, documented observation in the Project Area.	**NI** – No impacts.
S – Habitat suitable and species suspected to occur in the Project Area.	**MIIH** – May impact individuals or habitat, but will not likely contribute to a trend toward Federal listing or a loss of viability to the population or species.
NS – Habitat suitable, but species is not suspected to occur in the Project Area.	**WIPV** – Will impact individuals or habitat with a consequence that the action may contribute to a trend toward Federal listing or cause a loss of viability to the population or species.
NP – Habitat not present and species unlikely to occur in the Project Area.	**BI** – Beneficial impacts.

Appendix B. Raptor Nests Near the Longbow Project

Table B. Raptor Nests within 0.5-Mile of the Proposed Longbow Project Area (HWA 2012)

HWA Nest ID	BLM Nest ID	Species	2012 Status	Nest Condition	Wells within 0.5 mile	Distance (miles)	Direction from Well
60	1064	Ferruginous Hawk	Inactive	Gone	None	NA	NA
61	1078	Ferruginous Hawk	Inactive	Gone	None	NA	NA
62	1080	Ferruginous Hawk	Inactive	Gone	None	NA	NA
66	1092	Ferruginous Hawk	Inactive	Gone	None	NA	NA
67	1093	Ferruginous Hawk	Inactive	Gone	None	NA	NA
68	1097	Ferruginous Hawk	Inactive	Fair	None	NA	NA
72	1121	Golden Eagle	Inactive	Gone	None	NA	NA
73	1127	Ferruginous Hawk	Inactive	Gone	None	NA	NA
74	1129	Red-tailed Hawk	Inactive	Gone	None	NA	NA
75	4586	Golden Eagle	Inactive	Gone	None	NA	NA
76	1144	Golden Eagle	Inactive	Gone	None	NA	NA
77	14	Ferruginous Hawk	Inactive	Gone	Longbow 09-30H Longbow 205-30H Longbow 05-30H Longbow 06-30H Longbow 203-30H Longbow 204-30H	0.5	NW
80	1891	Ferruginous Hawk	Inactive	Gone	Longbow 09-30H Longbow 205-30H	0.25	E
81	1892	Ferruginous Hawk	Inactive	Gone	None	NA	NA
82	1893	Ferruginous Hawk	Inactive	Gone	None	NA	NA
83	1894	Ferruginous Hawk	Inactive	Gone	None	NA	NA
105	2471	Ferruginous Hawk	Inactive	Good	None	NA	NA
106	2472	Ferruginous Hawk	Inactive	Fair	None	NA	NA
107	2473	Ferruginous Hawk	Inactive	Good	None	NA	NA
110	2480	Ferruginous Hawk	Inactive	Good	None	NA	NA
111	2481	Ferruginous Hawk	Inactive	Good	Longbow 09-30H Longbow 205-30H	0.25	E
112	2482	Ferruginous Hawk	Inactive	Poor	Longbow 09-30H Longbow 205-30H Longbow 05-30H Longbow 06-30H Longbow 203-30H Longbow 204-30H	0.5	NW
113	2483	Ferruginous Hawk	Inactive	Good	None	NA	NA
161	3392	Golden Eagle	Inactive	Gone	None	NA	NA
193	5096	Ferruginous Hawk	Inactive	Good	None	NA	NA
204	**5482**	**Ferruginous Hawk**	**Active**	**Excellent**	**None**	**NA**	**NA**
207	5492	Ferruginous Hawk	Inactive	Good	None	NA	NA
266	12732	Ferruginous Hawk	Inactive	Gone	Longbow 10-32H Longbow 202-32H	0.5	SW
267	12733	Ferruginous Hawk	Inactive	Gone	Longbow 10-32H Longbow 202-32H	0.5	SW
268	12734	Ferruginous Hawk	Inactive	Gone	Longbow 10-32H Longbow 202-32H	0.5	SW

Appendix C, Terms, Wyoming Reclamation Policy, Reclamation Plan and Soil Map

The term Limited Reclamation Potential (LRP) came from the Wyoming Statewide Reclamation Policy Instruction Memorandum (IM) WY-2012-032, Wyoming BLM Reclamation Policy. BLM provides the glossary definition and policy discussion below.

Limited Reclamation Potential (LRP) - Areas possessing unique landscape characteristics (e.g., sensitive geologic formations, extremely limiting soil conditions, biological soil crusts, badlands, rock-outcrops, etc.) often make reclamation success impractical and/or unrealistic due to physical, biological, and/or chemical challenges. When disturbed, these areas may require unconventional reclamation strategies to address the ten requirements established by this policy.

(Adapted from various sources) During the NEPA process, alternatives to approving development activities in LRP areas should be carefully analyzed. Alternatives considered should include: avoidance and/or unconventional site specific reclamation requirements. Resource development activities approved in these areas may require additional bonding.

The Buffalo Field Office uses Natural Resource Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO) soils data and USDA arc-view extensions to identify areas potentially containing LRP sites. This GIS analysis helps identify potential resource issues the project may impact. Areas identified as LRP areas include but are not limited to: Areas susceptible to mass movement, blown-out areas, and very shallow soils (≤ 10 inches), paralithic and lithic material, chemical properties rated unsuitable in WYDEQ Land Quality topsoil and overburden criteria, and cumulative physical, chemical, and site properties that make reclamation problematic. LRP areas are field verified at the onsite investigation. BLM refines the preliminary SSURGO data analysis during the onsite investigation, and project design review to identify potential impacts to sensitive soils and to assure proper mitigation is applied.

Many of the components defined as LRP areas are identified in the SSURGO data as miscellaneous areas. Miscellaneous areas have essentially no soil and support little or no vegetation. They can result from active erosion, washing by water, unfavorable soil conditions, or human activities. Some miscellaneous areas can be made productive, but only after major reclamation efforts. (430-VI-NSSH, 1996)
The following are a few of the recognized miscellaneous areas identified in the Powder River Basin by NRCS Soil Surveys.

- Badlands. A landscape which is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes with narrow interfluves. Badlands develop on surfaces with little or no vegetative cover, overlying unconsolidated or poorly cemented materials (clays, silts, or in some cases sandstones) sometimes with soluble minerals such gypsum or halite. (430-VI-NSSH, 1996)
- Dune land. Consists of sand in ridges and intervening troughs that shift with the wind. (430-VI-NSSH, 1996)
- Gullied land. Consists of areas where erosion has cut a network of v-shaped or u-shaped channels. The areas resemble miniature badlands. Generally, gullies are so deep that extensive reshaping is necessary for most uses. (430-VI-NSSH, 1996)
- Rock outcrop. Consists of exposures of bare bedrock. Most rock outcrops are hardrock, but some are soft. (430-VI-NSSH, 1996)
- Subgroups and above level of soil taxonomy. The subgroup level of classification emphasizes processes related to soil development, and has a very broad range of soil characteristics that make site-specific interpretation difficult to predict. Other areas identified as LRP areas include: Areas susceptible to mass movement, Blown-out Areas, and Very Shallow Soils (≤ 10 inches).

LRP areas are field verified at the notice of staking or onsite investigation. The preliminary SSURGO data analysis is refined during the onsite investigation and project design review to identify potential impacts to sensitive soils and to assure proper mitigation is applied.

Project design needs to include a description of the created site and mitigation provided in the form of design features. While some of these project design features would not be classified as LRP areas, they are identified in the PRB-FEIS as areas which need to be mitigated with the design of the project. The cumulative impact of the created environment needs to mitigated *and* approved by the AO. Predicted disturbance would expose material deep within the soil material, which may have chemical and physical properties contributing to limited reclamation potential (LRP) properties.

- Amount of bareground, physical and chemical properties, and site conditions potentially create soils classified as highly erosive to wind and water erosion.
- The proposed cut and fill slopes 1½:1 (67%) and 2:1 (50%) slopes are greater than the 25% slope avoidance area identified in the PRB FEIS.
- Suitability of material for projected construction practices may need design mitigation.

Detailed Construction - Stabilization and Reclamation Plan

Goal: Re-establish a functioning ecosystem that provides and maintains hydrologic function, wildlife habitat, soil stability, domestic livestock grazing, and visual properties to promote final reclamation. Operators will address stabilization and reclamation at each phase of the project; construction/drilling, interim reclamation, and final reclamation.

a. Construction & Drilling Phase
   i. Goals:
      1. Provide safe, stable working environment.
      2. Topsoil: salvage, stabilize and protect.
      3. Sediment containment: Prevent soil from leaving site.
   ii. Design Features:
      1. Engineer design of the pad and any additional requirements identified at the notice of staking (NOS).
      2. Additional information (e.g. geotechnical analysis suitability of material excessive cut/fill stability)
      3. Pad size: adequate size and stability to accommodate operations.
      4. Topsoil: amount of topsoil to be salvaged; how and where will it be stored. Describe how it will be stabilized.
      5. Subsoil and spoil management.
      6. Describe methods used to prevent run-on from the pad to fill slopes.
      7. Method used to stabilize fill materials.
      8. Methods to prevent sediment leaving cut/fill slope and pad area; reduce velocity of any surface flow, and containment of sediment onsite. Monitor and maintain until drilling is complete.
b. Interim Reclamation Phase
   i. Goal: Facilitate stable, functioning ecosystem during production, while preparing for final reclamation.
   ii. Site-specific detail:
      1. Methods used to reduce cut and fill slope length, prevent erosion, promote vegetation establishment, and prevent run-on to the pad working area. (Depending on watershed area, stability and vegetative cover.)
      2. Pad size will be reduced to interim design provided in SUP. Fill slopes will be minimized to a 2:1 or 3:1. Cut slopes will be reduced from 1-1/2:1 to 2:1 using fill slope material to reduce total pad disturbance. Total foot print needs to be reduced and quantified in the MSUP.
      3. Pad stabilization:

4. Method(s) to reduce slope length, capture and store surface runoff, promote vegetation, and prevent erosion.
5. Maintenance plan established after each storm event or monthly whichever is more frequent.
6. Apply topsoil evenly over entire disturbance area not needed for daily maintenance and operation. This will help promote interim and final reclamation success, prevent erosion, and prevent erosion and sedimentation leaving the pad. Maybe mowed if needed, most currently are grazed by domestic livestock and wildlife.
7. Gravel the working area and travel way of the pad. This will provide for all-weather access, reduce erosion and compaction, and promote reclamation.
8. Berms designed to channel water from the pad (without concentrating that causes erosion), berms need to have topsoil applied and seeded (how will this be achieved). Berm outlet needs to prevent erosion and gullies from cutting into the fill slopes of the pad, dissipate energy and spreading water on to established vegetation.
9. Describe seedbed preparation methods that will be implemented that will result in a smooth, firm seedbed.
10. Seeding will be broadcast at double the rate, and provide proper seed soil contact or drill-seeded with the appropriate machine on the contour.
11. Describe method used to stabilize the site and the seed.
12. Provide seed mix, BLM or private mix provided by a surface landowner, with appropriate mix of grasses, forbs, and shrubs.

c. Final Reclamation Phase
   i. Goal: Facilitate eventual ecosystem reconstruction to maintain a safe and stable landscape and meet the desired outcomes of the land use plan.
      1. Describe practices necessary to reclaim all disturbed areas including access roads, pipelines, etc.
      2. The operator may amend this reclamation plan at the time of abandonment.
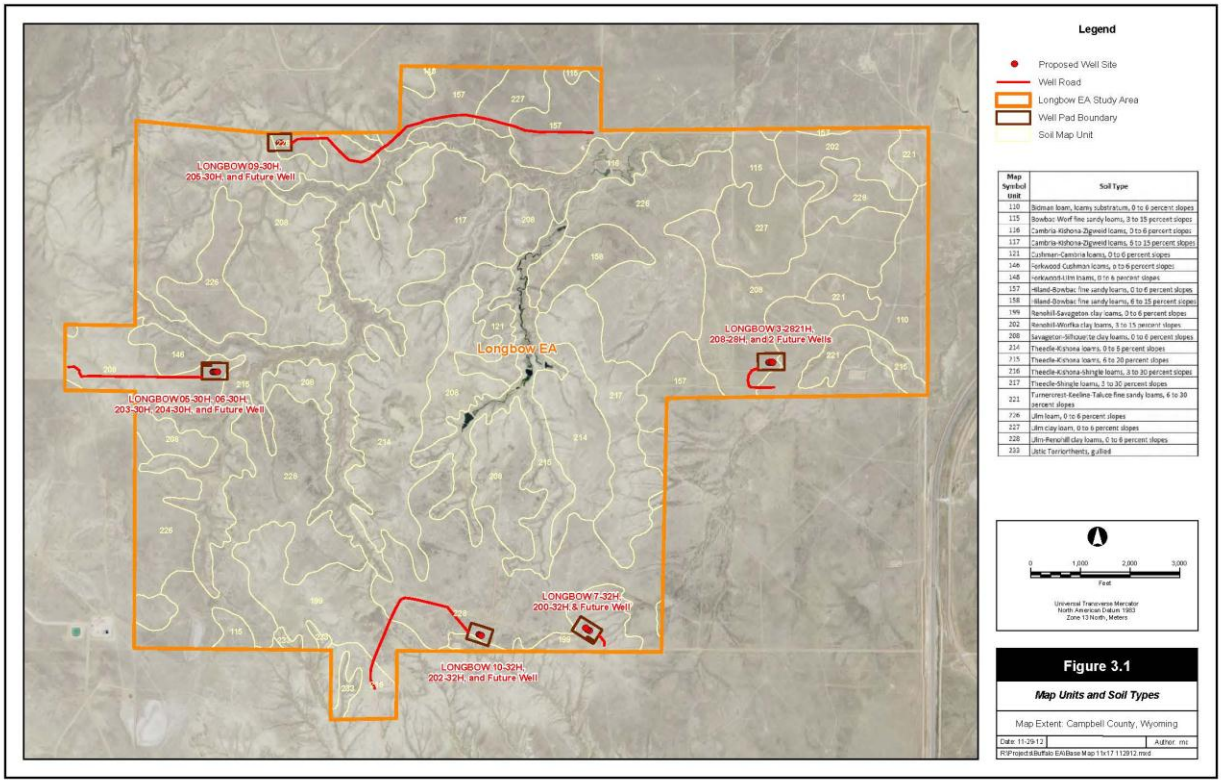
Figure C-1 – Map Units and Soil Types