DECISION RECORD
Environmental Assessment (EA), WY-070-EA13-15
EOG Resources, Inc., Ballista Flatbow Multi-Well Pad Project
Bureau of Land Management, Buffalo Field Office, Wyoming

DECISION. The BLM approves EOG Resources Inc. (EOG) Ballista Flatbow Multi-Well Pad Project's 25 applications for permit to drill (APDs) 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.

Wells. BLM approves the following APDs and support facilities (left column administrative numbers remain for consistency with EA, Decision Record and Recommended Mitigation Measures):

#	Well Name & #	Pad #	Qtr*	Sec	Twn	Rng	Surface Lease	Lateral Lease	BHL Lease
1	Flatbow 001-25H	264	SESE	25	42N	73W	WYW-141652	WYW-141219, WYW-139653, WYW-141652	WYW-141652
2	Flatbow 200-25H							WYW-141219, WYW-139653, WYW-141652	WYW-141652
3	Flatbow 002-25H	265	SWSW	25	42N	73W	WYW-141652	WYW-139653, WYW-141652	WYW-139653
4	Flatbow 201-25H							WYW-139653, WYW-141652	WYW-139653
6	Flatbow 004-26H	266	SWSW	26	42N	73W	WYW-141652	Fee, WYW-139655, WYW-141652	WYW-141652
8	Flatbow 203-26H							Fee, WYW-139655, WYW-141652	WYW-141652
10	Flatbow 007-34H	268	SESE	34	42N	73W	WYW-145545	Fed WYW-141652, WYW-145545, WYW-145546	WYW-145546
12	Flatbow 206-34H							Fed WYW-141652, WYW-145545, WYW-145546	WYW-145546

#	Well Name & #	Pad #	Qtr*	Sec	Twn	Rng	Surface Lease	Lateral Lease	BHL Lease
15	Ballista 2-10H	270	SWSW	10	41N	73W	WYW-145545	WYW-145545, WYW-109400	WYW-109400
16	Ballista 201-10H							WYW-145545, WYW-109400	WYW-109400
17	Ballista 003-1003H	271	SESE	10	41N	73W	WYW-145545	WYW-145545	WYW-145545
19	Ballista 202-1003H							WYW-145545	WYW-145545
21	Ballista 005-11H	272	SWSW	11	41N	73W	WYW-145545	WYW-145545	WYW-145545
22	Ballista 006-11H							WYW-145547, WYW-145545	WYW-145547
23	Ballista 204-11H							WYW-145545	WYW-145545
24	Ballista 205-11H							WYW-145547, WYW-145547	WYW-145547
25	Ballista 007-11H	273	SESE	11	41N	73W	WYW-145545	WYW-145545	WYW-145545
27	Ballista 206-11H							WYW-145545	WYW-145545
29	Ballista 009-12H	274	NWNW	12	41N	73W	WYW-145545	WYW-145545, Fee	WYW-145545
30	Ballista 010-12H							WYW-145545, Fee	WYW-145545
31	Ballista 208-12H							WYW-145545, Fee	WYW-145545
32	Ballista 209-12H							WYW-145545, Fee	WYW-145545
36	Ballista 211-01H	275	SESE	1	41N	73W	Fee	WYW 145545, Fee	Unleased Fed
39	Ballista 014-13H	277	NWNW	13	41N	73W	WYW-145545	WYW-145547	Open Fee
40	Ballista 213-13H							WYW-145547	Open Fee

*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 Ballista Flatbow Multi-Well Pad Project's APDs 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 BLM'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 to 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. 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: (acting) Date: 8/9/2013

FINDING OF NO SIGNIFICANT IMPACT
Environmental Assessment (EA), WY-070-EA13-15
EOG Resources, Inc., Ballista Flatbow 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-EA13-15, 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: (acting) Date: 3/9/2013

ENVIRONMENTAL ASSESSMENT (EA), WY-070-EA13-15
EOG Resources, Inc. Ballista-Flatbow Multi-Well Pad Project
Applications for Permit to Drill (APDs)
BUFFALO FIELD OFFICE, BUREAU OF LAND MANAGEMENT, WYOMING

1. PURPOSE AND NEED

BLM provides this environmental assessment (EA) in partial response to EOG Resources, Inc. (EOG) Ballista-Flatbow Multi-well Pad Project and 25 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 [RMP] Amendment (PRB FEIS), WY-070-02-065 (2003), and it's Record of Decision (ROD) per Title 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21. The PRB FEIS is available for review at the BLM Buffalo Field Office (BFO) and on the BLM's 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. The APDs associated with this proposal exceed the analysis 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 Ballista-Flatbow Multi-Well Pads Project that were not specifically addressed in the PRB FEIS. Thirteen proposed pads and APDs have split jurisdiction (private (fee) surface over federal mineral estate). BLM has lesser jurisdiction on one pad that hosts 2 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 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 proposal.

1.1. Background

Surface ownership in the proposal area is private land. The proposed project consists of constructing, drilling, completing, and operating the 25 proposed oil and natural gas wells, and perhaps as many as 78 wells from 13 pads. Presently BLM received these 25 APDs, 15 project-affiliated NOSs, and an EOG concept that, depending upon production success, economics, and regulations the company may aspire to drill as many as 78 wells (perhaps 6 per pad). EOG and BLM held an initial planning meeting for the project on March 15, 2012. EOG filed notices of staking (NOS) in May 2012. BLM and EOG conducted field inspections of 11 of the 13 proposed well pads from 21 to 23 May, 2012.

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

- Flatbow 001-25H, 200-25H (Pad #264, SESE Section 25 T42N, R73W, Lease Fed-WYW141652, WYW-141219, WYW-139653),
- Flatbow 002-25H, 201-25H (Pad #265, SWSW Section 25 T42N, R73W, Lease Fed WYW-139653, WYW-141652),
- Flatbow 004-26H, 203-26H (Pad #266, SWSW Section 26 T42N R73W, Lease WYW-139655, WYW-141652, Fee),
- Flatbow 006-34H, 007-34H, 205-34H, 206-34H (Pad #268, SESE Section 34 T42N, R73W, Lease Fed WYW-145546, Fed WYW-141652, WYW-145545, Open Federal Minerals, Fee),
- Ballista 2-10H, 201-10H (Pad #270, SWSW Section 10 T41N, R73W, Lease Fed-WYW-109400, WYW-145545),

- Ballista 3-1003H, 202-1003H, (Pad #271, SESE Section 10 T41N, R73W, Lease Fed-WYW-145545, WYW-145546, Open Federal Minerals),
- Ballista 005-11H, 006-11H, 204-11H, 205-11H (Pad #272, SWSW Section 11 T41N, R73W, Lease Fed WYW-145545, WYW-145547),
- Ballista 007-11H, , 206-11H, (Pad #273, SESE Section 11 T41N, R73W, Lease Fed WYW-145545, Unleased Fee Tract, Fee),
- Ballista 009-12H, 010-12H, 208-12H, 209-12H (Pad #274, NWNW Section 12 T41N, R73W, Lease Fed WYW-145545, Fee),
- Ballista 211-01H (Pad #275, SESE Section 1 T41N, R73W, Lease Fed WYW-145545, Unleased Federal, Fee),
- Ballista 212-13H (Pad #276, NENE Section 13 T41N, R73W, Lease Fed WYW-145547, Unleased Federal, Fee),
- Ballista 014-13H (Pad #277, NWNW Section 13 T41N, R73W, Lease Fed WYW-145547, Open Fee, Fee).

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 RMP's 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. 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 potential environmental effects of anticipated construction, operation, abandonment, and removal of all foreseeable wells and facilities associated with this oil and gas exploration. Full effects of the action, COAs, and recommended mitigation measures (RMMs) are in this EA (Ballista-Flatbow Multi-Well Pads Project, WY-070-EA13-15) 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, in the PRB area received 3 comments, revealing no new 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. The project area is clearly lacking wilderness characteristics as there is no federal surface. Project issues include:

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

The following issues are not present, or minimally so. BLM analyzed them in the PRB FEIS. As such, these resources will not be analyzed in this EA:

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

2. PROPOSED PROJECT AND ALTERNATIVES

BLM analyzed 2 alternatives (Alternative A and Alternative B) to determine how to best meet BLM's purpose for the proposal. 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 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., Ballista-Flatbow Multi-Well Pads Project (proposal – 13 pads hosting 25 APDs) is an oil and gas exploration project in southern Campbell County, Wyoming. The project area is in an existing coal bed natural gas (CBNG) production area. The BLM completed NEPA analysis, issued findings and decisions covering 50 wells for EOG in the vicinity of this proposal. The project area is 13 miles southeast of Wright and 1 mile southeast of Wyoming Highway 387 and 6 miles west of Wyoming Highway 59. The project area has 16,275 acres covering 25.4 square miles of land in Townships 41 and 42 North, Range 73 West. The project area occurs in the Thunder Basin National Grassland yet is on private land. The surface owner is Floyd C. Reno & Sons and Jerry Dilts, LPI.

EOG proposes to explore for and develop oil and natural gas underlying oil and gas leases they own (Figure 2.1). EOG may drill, complete, produce, and eventually reclaim up to 78 well bores to the Turner, Parkman, Niobrara, and Mowry Formations and other potential zones from 13 separate well pads. When BLM prepared this analysis, EOG submitted 25 APDs to the BLM. If EOG pursues drilling the other well bores, they will submit corresponding 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).

Table 2.1 Well/*NOS* Name, Number, Pad Number, Location, and Lease

#	Well/*NOS* & #	Pad #	Qtr*	Sec	Twn	Rng	Surface Lease	Lateral Lease	BHL Lease
1	Flatbow 001-25H	264	SESE	25	42N	73W	WYW-141652	WYW-141219, WYW-139653, WYW-141652	WYW-141652
2	Flatbow 200-25H							WYW-141219, WYW-139653, WYW-141652	WYW-141652
3	Flatbow 002-25H	265	SWSW	25	42N	73W	WYW-141652	WYW-139653, WYW-141652	WYW-139653
4	Flatbow 201-25H							WYW-139653, WYW-141652	WYW-139653
5	*Flatbow 003-26H*	266	SWSW	26	42N	73W	WYW-141652	Fee	Fee
6	Flatbow 004-26H							Fee, WYW-139655, WYW-141652	WYW-141652
7	*Flatbow 202-26H*							Fee	Fee
8	Flatbow 203-26H							Fee, WYW-139655, WYW-141652	WYW-141652
9	*Flatbow 006-34H*	268	SESE	34	42N	73W	WYW-145545	Fee	Open Federal
10	Flatbow 007-34H							FED WYW-141652, WYW-145545, WYW-145546	WYW-145546
11	*Flatbow 205-34H*							WYW-141652, Fee	Open Federal
12	Flatbow 206-34H							FED WYW-141652, WYW-145545, WYW-145546	WYW-145546
13	*Ballista 1-02H*	269	SESE	2	41N	73W	Fee	WYW-145545	Open Minerals
14	*Ballista 200-02H*							WYW-145545	Open Minerals
15	Ballista 2-10H	270	SWSW	10	41N	73W	WYW-145545	WYW-145545, WYW-109400	WYW-109400
16	Ballista 201-10H							WYW-145545, WYW-109400	WYW-109400
17	Ballista 003-1003H	271	SESE	10	41N	73W	WYW-145545	WYW-145545	WYW-145545
18	*Ballista 004-10H*							WYW-145545, WYW-145546	WYW-145546, Open Minerals
19	Ballista 202-1003H							WYW-145545	WYW-145545
20	*Ballista 203-10H*							WYW-145545, WYW-145546	WYW-145546, open Federal Minerals
21	Ballista 005-11H	272	SWSW	11	41N	73W	WYW-145545	WYW-145545	WYW-145545
22	Ballista 006-11H							WYW-145547, WYW-145545	WYW-145547
23	Ballista 204-11H							WYW-145545	WYW-145545
24	Ballista 205-11H							WYW-145547, WYW-145547	WYW-145547
25	Ballista 007-11H	273	SESE	11	41N	73W	WYW-145545	WYW-145545	WYW-145545
26	*Ballista 008-11H*							WYW-145545, Unleased Fee tract	Fee
27	Ballista 206-11H							WYW-145545	WYW-145545
28	*Ballista 207-11H*							WYW-145545, Unleased Fee tract	Fee
29	Ballista 009-12H	274	NWNW	12	41N	73W	WYW-145545	WYW-145545, Fee	WYW-145545
30	Ballista 010-12H							WYW-145545, Fee	WYW-145545

#	Well/*NOS* & #	Pad #	Qtr*	Sec	Twn	Rng	Surface Lease	Lateral Lease	BHL Lease
31	Ballista 208-12H							WYW-145545, Fee	WYW-145545
32	Ballista 209-12H							WYW-145545, Fee	WYW-145545
33	*Ballista 011-01H*	275					Fee	WYW145545, Fee	Unleased Federal
34	*Ballista 012-01H*							WYW145545, Fee	Unleased Federal
35	*Ballista 210-01H*							WYW145545, Fee	Unleased Federal
36	Ballista 211-01H		SESE	1	41N	73W		WYW145545, Fee	Unleased Federal
37	*Ballista 013-13H*	276	NENE	13	41N	73W	WYW-145547	WYW-145547, Fee,	WYW-145547, Unleased Federal
38	*Ballista 212-13H*							WYW-145547, Fee,	Unleased Federal, WYW-145547
39	Ballista 014-13H	277	NWNW	13	41N	73W	WYW-145545	WYW-145547	Open Fee
40	Ballista 213-13H							WYW-145547	Open Fee

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

EOG's development plan 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

Primary access to the project area would be from Wyoming Highway 387, which runs generally northeast/southwest along the northwest side of the project area. EOG proposes building new access roads off of existing well field and two-track ranch roads to each proposed well pad. 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 to the proposed well locations 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. An estimated 15.5 miles of new access roads would be required to provide equipment and vehicle access to the proposed 13 well pads. New access road construction would result in approximately 75 acres of surface disturbance (Tables 2.2 and 2.3). For specifics on construction practices, drilling, and production operations, refer to the APDs' master surface use plan (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.

2.2.2. Drilling, Construction and Production Design Features

EOG anticipates drilling and construction would be completed three years after initiation. Estimates of surface disturbance related to well pads and access roads are presented in Tables 2.2 and 2. 3. 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 12 400-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.

Table 2.2. Well Pad Area Totals (Disturbance, Reclamation, and Roads in Acres)

	Pad ID #	Max # of wells	Pad Disturbance	Interim Reclamation	Access Road	Access Road
	264	6	4.8 acres	1.7 acres	1.3 miles	6.3 acres
	265	6	4.6 acres	1.7 acres	6.5 miles	31.5 acres
	266	6	5.3 acres	2.6 acres	2.8 miles	13.3 acres
	268	6	5.0 acres	1.9 acres	0.4 miles	2.0 acres
	269	6	4.5 acres	1.6 acres	0.4 miles	2.2 acres
	270	6	4.6 acres	1.7 acres	1.8 miles	8.8 acres
	271	6	5.1 acres	1.7 acres	0.01 miles	0.1 acres
	272	6	5.3 acres	1.7 acres	0.4 miles	1.9 acres
	273	6	5.0 acres	1.7 acres	0.4 miles	2.0 acres
	274	6	4.9 acres	2.2 acres	0.4 miles	1.8 acres
	275	6	5.4 acres	1.7 acres	0.8 miles	3.9 acres
	276	6	4.8 acres	1.8 acres	0.05 miles	0.3 acres
	277	6	4.5 acres	1.8 acres	0.2 miles	1.0 acres
Total	13	78	63.8 acres	23.6 acres	15.5 miles	75.1 acres

Table 2.3. Disturbance During Construction and Interim/Production

Activity	Length (feet)	Width (feet)	Disturbance (acres)
Pad ID # 264			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	4.8
Access Road	6,834	40	6.3
Total Initial Disturbance	---	---	11.2
Pad ID # 265			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	4.6
Access Road	34,266	40	31.5
Total Initial Disturbance	---	---	36.1
Pad ID # 266			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	5.3
Access Road	14,535	40	13.3
Total Initial Disturbance	---	---	18.6
Pad ID # 268			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	5.0
Access Road	2,191	40	2.0
Total Initial Disturbance	---	---	7.0
Pad ID # 269			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	4.5
Access Road	2,374	40	2.2

Activity	Length (feet)	Width (feet)	Disturbance (acres)
Total Initial Disturbance	---	---	6.7
Pad ID # 270			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	4.6
Access Road	9,552	40	8.8
Total Initial Disturbance	---	---	13.4
Pad ID # 271			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	5.1
Access Road	84	40	0.1
Total Initial Disturbance	---	---	5.2
Pad ID # 272			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	5.3
Access Road	2,047	40	1.9
Total Initial Disturbance	---	---	7.2
Pad ID # 273			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	5.0
Access Road	2,225	40	2.0
Total Initial Disturbance	---	---	7.0
Pad ID # 274			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	4.9
Access Road	1,960	40	1.8
Total Initial Disturbance	---	---	6.7
Pad ID # 275			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	5.4
Access Road	4,240	40	3.9
Total Initial Disturbance	---	---	9.3
Pad ID # 276			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	4.8
Access Road	268	40	0.2
Total Initial Disturbance	---	---	5.0
Pad ID # 277			
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	4.5
Access Road	1,045	40	1.0
Total Initial Disturbance	---	---	5.5

2.2.3. Drilling and Completion Water Sources and Amounts

The proposal is to drill and develop oil/gas wells into the Turner, Niobrara, Mowry, Parkman and other potential formations. EOG's proposal includes the use of 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. EOG plans to obtain fresh water from 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 (WSEO). The depth of the Fox Hills Formation is about 5,000 to 5,500 feet in the proposed project 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 on a pad. Each additional well would require the same amount of water but the truckloads per day would be reduced to 18.

Figure A.1, below, 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 of the proposed wells 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, where applicable, it has a surface access agreement with the landowner(s) 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, page 2, paragraph 6).

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 2 week period per well), the average daily traffic would increase to 26 large trucks and 2 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 1 or fewer pickup trucks per day.

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 Turner, Niobrara, Mowry, Parkman 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 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% 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 water wells and/or commercial sources in or near the project area.

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. EOG will capture all fluids returned during the flow-back procedure in steel tanks situated on the well. EOG will ultimately dispose these recaptured fluids per BLM and the Wyoming Oil and Gas Conservation Commission (WOGCC) rules and regulations. EOG will use any fresh water remaining in the hydraulic fracturing reservoir following the completion operations 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 will not use reserve mud pits, 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, Environmental Assessments, Foreseeable Development

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. Mineral and oil and gas development are prevalent throughout the Buffalo planning area, including the vicinity of this proposal. 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 coal bed natural gas and 3,200 natural gas and oil wells), associated infrastructure (roads and utilities), 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 similar development projects in the vicinity of the proposed Ballista-Flatbow Project including the Longbow and Bolt (up to 30 well bores). EOG indicated later reasonably foreseeable development may include an additional 15 APDs in the footprint of this proposal for a total of 40 APDs, and perhaps as many as 78 wells. The potential for other adjacent and overlapping developments also exists.

3. AFFECTED ENVIRONMENT

This section briefly describes the physical and regulatory environment that may receive significant affects from the implementation of the alternatives described in Section 2, or where changes in circumstances or regulations occurred since adoption of 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. Nearly all 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.

There are 244 producing CBNG, oil and gas wells in the project area (WOGCC 2012). The total number of conventional wells in the Buffalo planning area is 1313, which includes 783 horizontal wells (federal, fee, and state) (as of April 2013). This represents 41% of the projected 3,200 in the 2003 PRB ROD. The current oil and gas related surface disturbance in the project area is estimated to be 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 the project area. BLM decisions to approve or deny future proposals will occur following APD submittal. Development occurring on fee surface and mineral estate would continue.

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 proposal area's topography includes low rolling hills between 4,900 feet above mean sea level (MSL) and 5,250 above MSL (the well pads are located between 4,805 and 4,926 feet above MSL) and large, open flat areas. The drainages in the proposal area include Little Bates and Spring Creeks –Cheyenne River tributaries. The riparian areas have sparse cottonwoods, scattered juniper and scattered dense sagebrush. The primary private land uses include ranching, livestock grazing, and recreational hunting. Grasslands with sparse, short sagebrush dominate the area's vegetation. Typical precipitation is between 10 to 14 inches per year, with most of the precipitation occurring during late winter and spring. The surface ownership is a mixture of private, state, and federal surface, with cattle grazing, coal mining, and oil and gas development being 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.

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

POD Name/Operator	NEPA Analysis	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

POD Name/Operator	NEPA Analysis	Well # /Type	Approval
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
Crazy Cat East/Anadarko	WY-070-EA13-028	36/Oil	02/2013
Cherokee Ridge Alpha/Petro-Hunt	WY-070-EA12-070	6/Oil	06/2012

3.1. Air Quality

Wyoming's Department of Environmental 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 finalized ozone standards 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 one of the nation's 40 "nonattainment" zones for ozone in 2012; in addition to PRB-area air quality alerts issued in 2011, 2012, and 2013 for particulate matter (PM), attributed to coal dust. Four sites monitor the air quality in the PRB: Cloud Peak in the Bighorn Mountains, Thunder Basin northeast of Gillette, Campbell County south of Gillette, and Gillette. In addition, the Wyoming Air Resource Monitoring System (WARMS) measures meteorological parameters from 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 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.

Dominant soils in the proposed project area include fine-loamy to sandy, Mesic Ustic Paleargids, Ustic Haplargids, and Ustic Haplocambids. Major soil series and complexes that are most 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) or online 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 ID #	Map Unit Name	Acres	Pad %
200	264	Renohill-Savageton clay loams, 6 to 15% slopes	2.2	61.2
158	265	Hiland-Bowbac fine sandy loams, 6 to 15% slopes	2.2	62.4
157	266	Hiland-Bowbac fine sandy loams, 0 to 6% slopes	2.3	58.1
157	268	Hiland-Bowbac fine sandy loams, 0 to 6% slopes	3.0	77.3
158	269	Hiland-Bowbac fine sandy loams, 6 to 15% slopes	3.6	100.0
122	270	Cushman-Cambria loams, 6 to 15% slopes	3.4	96.6
145	271	Forkwood-Cambria loams, 0 to 6% slopes	3.9	100.0
158	272	Hiland-Bowbac fine sandy loams, 6 to 15% slopes	3.9	100.0
157	273	Hiland-Bowbac fine sandy loams, 0 to 6% slopes	3.9	100.0
190	274	Parmleed-Renohill complex, 3 to 15% slopes	3.9	100.0
128	275	Cushman-Worf loams, 3 to 15% slopes	3.9	100.0
158	276	Hiland-Bowbac fine sandy loams, 6 to 15% slopes	2.4	68.7
157	277	Hiland-Bowbac fine sandy loams, 0 to 6% slopes	2.9	80.5

The Hiland-Bowbac fine sandy loams consist of moderately deep to very deep, well-drained soils on slopes from 0 to 15%. The Hiland soils are formed in alluvium, and eolian deposits on relict surfaces consisting of terraces, fans, fan remnants, pediments, ridges, hills, and stabilized dunes. The Bowbac soils are residuum derived from a clayey sandstone parent material and are on fan remnants, piedmonts, plateaus, ridges and buttes. These soils have a moderate permeability, medium particle cohesiveness, and a medium to low runoff potential depending on slope and vegetation. The A horizon varies in thickness between 0 and 3 inches. Native vegetation associated includes big sagebrush, silver sagebrush, rhizomatous wheatgrass, blue grama, needle-and-thread grass, western wheatgrass, and big sagebrush.

The Bidman-Parmleed series are well-drained soils that form in alluvium derived from calcareous shale. Permeability is low, the hazard of water erosion is low and wind erosion is moderate. Bidman soils are on hills and ridges and Parmleed soils are on summits and shoulders and hills, terraces, ridges, and plateaus. The Bidman series consists of very deep, well-drained soils that formed in alluvium weathered from shale bedrock. Bidman soils are on alluvial fans, fan remnants, terrace, ridges and hills. The Parmleed series

consists of moderately deep, well-drained soils that formed in material weathered from sandstone and shale. Slopes typically range from 0 to 25%. E horizons range from 0 to 5 inches. Associated native vegetation includes blue grama, western wheatgrass, cactus, green needlegrass, and Idaho fescue.

The Bidman-Ulm loams occur on slopes between 0 and 6% and are very deep and well-drained. The Ulm series consists of very deep well-drained soils that formed in calcareous alluvium derived from sedimentary rock. Ulm soils are on relict terraces, alluvial fans, fan remnants, plateaus, ridges and hills. The soils in this complex have a varying A horizon thickness between 0 and 4 inches. These soils are used mostly for livestock grazing. Some areas are used for dry farming of small grains. Native vegetation associated with these soils includes western wheatgrass, blue grama and big sagebrush.

The Renohill soil is moderately deep, well-drained, and formed in clayey residuum derived dominantly from calcareous shale. Permeability is slow. The associated plant community is mainly grasses. Main uses are livestock grazing and wildlife habitat. The Parmleed series consists of moderately deep, well-drained soils that formed from weathered sandstone and shale. Parmleed soils are on hills, terraces, ridges and plateaus. The soils in this complex have a varying A horizon ranging from 0 to 4 inches and E horizon in the Parmleed ranging from 0 to 5 inches. Typically associated native vegetation consists of western wheatgrass, green needlegrass, blue grama, scattered big sagebrush, green needlegrass, and Idaho fescue.

The Forkwood series consists of very deep, well-drained soils formed in alluvium. Forkwood soils are on terraces, alluvial fans, fan remnants, hills, ridges and pediments. The Cambria series consists of very deep, well-drained, moderately permeable soils that formed in alluvium and slope alluvium on fan remnants, alluvial fans, fan piedmonts, terraces, ridges and hills. Slopes range from 0 to 15% and are usually simple but may be complex where dissected by ephemeral streams. The soils are well-drained with low or medium runoff and moderate permeability. Native vegetation typically associated with these soils includes big sagebrush, bluebunch wheatgrass, Sandberg bluegrass, and needle-and-thread.

The Cushman-Cambria loams are very deep, well-drained, moderately permeable soils that formed in alluvium and slope alluvium on fan remnants, alluvial fans, fan piedmonts, terraces, ridges, and hills. The Cushman series consists of well-drained soils that are moderately deep to bedrock. They formed in slopewash alluvium and residuum from interbedded shales and siltstone and fine-grained argillaceous sandstone. Cushman soils are on buttes, fan remnants, hills, piedmonts, ridges, and terraces. The soils have an A horizon from 0 to 4 inches. Native vegetation includes western wheatgrass, needle-and-thread, big sagebrush, blue grama, bluebunch wheatgrass, and Sandberg bluegrass.

The Cushman-Worf series consists of well-drained soils that are moderately deep to very shallow or shallow to bedrock. They formed in residuum and colluvial slopewash weathered from sedimentary rock. Worf soils are on upland hills and ridges and have slopes of 0 to 30%. They are well-drained with medium or rapid runoff depending upon slope and moderate permeability. The A horizon is between 0 and 4 inches in thickness. Native vegetation typically associated with these soils includes western wheatgrass, needle-and-thread, big sagebrush, cactus, and blue grama.

The Keeline series consists of very deep, well or excessively-drained soils formed in alluvium or eolian deposits derived from sandstone. Keeline soils are on upland ridge tops, hill slopes, terraces, benches, alluvial fans, and fan remnants. These soils are associated with slopes of 0 and 40%. They are well or excessively-drained with slow runoff and moderately rapid permeability. The Tullock series consists of moderately deep, excessively-drained soils formed in residuum, alluvium or eolian deposits derived from sandstone. They are on dunes, hills and ridges. These soils occur on slopes of 0 to 45%. They are excessively-drained with rapid permeability. Runoff is from negligible to low depending on slope. These soils have an A horizon from 0 to 5 inches. Native vegetation includes needle-and-thread, prairie sandreed, Indian ricegrass, little bluestem, sand bluestem, and Indian ricegrass.

The Renohill-Savegeton clay loams are well-drained with moderately deep to soft bedrock. These fine soils form in alluvium, colluvium, and residuum. Renohill soils are on bedrock controlled plateaus, alluvial fans, hills, and ridges with slopes of 0 to 6%. The runoff potentials vary based on slope and range from low to high. Permeability is slow. The Savageton series has moderately deep, well-drained, slowly permeable soils. They formed in alluvium, colluvium, and residuum derived dominantly from shale on hills, ridges, fan remnants, piedmonts, and aprons. The A horizon is from 0 to 5 inches and primary land uses are rangeland, wildlife habitat, and small hay or small grain crops. 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. Access roads associated with Pads 264, 265, 266, 269, 271, 272, 273, and 277; and Pads 265, 266, 268, 272, 273, 276, and 277 are associated with sandy ecological sites. The majority of proposed access routes are existing two-tracks, of which most would require improvement or upgrade. In addition to sandy soils, Pad 276 also has soils that are susceptible to wind erosion, as determined using GIS analysis. Sandy ecological sites and soils susceptible to wind erosion that are associated with proposed access routes and well pads would be stabilized and reclaimed, as described in EOG's MSUP. Table 3.3 shows the relative erosion potential in the project boundary.

Table 3.3. Relative Erosion Potential within EA Boundary

Erosion Potential (wind & water)	Acres	% of Project Area
Slight/Moderate	12,994	80
Severe	3,281	20

Source: NRCS 2010

3.3. Vegetation and Ecological Sites

BLM confirmed during onsite inspections that the dominant vegetation community types in the project area are mixed grass prairie and sagebrush shrubland. Species observed during onsites include: 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 consists of 33 ecological sites, Table 3.4, loamy (10-14NP), sandy (10-14NP), and clayey (10-14NP). The Ecological Site interpretations include additional site-specific soil information.

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

MUS					Ecological Site	Acres in Project Area	% of Project Area
109	121	127	147	217	Loamy (10-14 NP)	9,336	56
111	122	128	178	226			
112	123	144	214				
113	124	145	215				
116	126	146	216				
139	158	170	213	130	Sandy (10-14 NP)	4,064	25
140	159	171	221				
157	160	193	236				
154	200	202	209	228	Clayey (10-14 NP)	985	6
199	201	208	227	229			

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

Loamy/Shallow Loamy Site description and plant community. This site occurs on steep slopes and ridge tops, but may occur on all slopes and consists of 56% 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 vegetation are 3 to 6 inches thick. The main soil limitations include the depth to lithologic discontinuity, and fragmental (90 percent 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. Dominant 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.

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 consists of 6% 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 is 25% of the project area. The soils are moderately deep to very deep (greater than 20 inches to bedrock), well-drained, that formed in eolian deposits or residuum derived from unspecified sandstone. These soils have moderate, moderately rapid, or rapid permeability. Soil limitations include low available water holding capacity, and high wind erosion potential. The plant community is similar to the Loamy site, above, except that Wyoming big sagebrush not as dominant.

3.4. Water Resources

WDEQ regulates Wyoming's water quality with oversight from the EPA. The Wyoming State Engineer's Office (WSEO) has authority for regulating water rights issues 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 for stock or domestic water. Shallow alluvial aquifers are present near ephemeral or intermittent streams, such as Little Bates, Spring, and West Prong of Spring Creeks. 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 from some of the CBNG wells indicates water quality is acceptable for beneficial use for livestock (Coleman Antelope Flats NPDES 2005). There are 177 CBNG and oil and gas wells and 2 water injection wells (WIW) within a 4-mile radius of the project area. A search of the WSEO Ground Water Rights Database showed 9 stock wells within 1 mile of the proposed wells in the project area with depths from 0 to 632 feet. There are 3 domestic wells within 1 mile of the proposed wells. See 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

The area's surface waters are small agricultural stock ponds and reservoirs in isolated depressions or gullies associated with ephemeral and intermittent streams. CBNG impoundments are also in the project area. The proposed well pads and their associated roads occur in 3 watersheds: Little Bates Creek watershed (hydrologic unit code [HUC] 101201010208; the central portion of the project area), Spring Creek (HUC 10120101303; northern portion of the project area), and Lower Bates Creek (HUC 10120101201; southern portion of the project area). Named surface water features in the project area and vicinity include Little Bates, Spring, and West Prong of Spring Creeks. These and associated small tributaries drain to the Cheyenne River. Most of the area drainages are ephemeral (flowing only in response to a precipitation event). 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 identified 1 natural spring within 1 mile of the pad #275. This spring is in the SESE of Section 1, T41N, R73W. See the PRB FEIS, pp. 3-36 to 3-56.

3.5. Wetlands/Riparian

See, Surface Waters, above, for a description of riparian areas and CBNG reservoirs. According to National Wetland Inventory (NWI) data, there are 84 potentially wetlands (estimated 187 wetland acres) in the project area. Of the 84 wetlands, 33 are in the Spring Creek watershed, 23 are in the Little Bates Creek watershed, and 28 are in the Lower Bates Creek watershed. The majority of these wetlands occur as palustrine emergent wetlands. Project area wetlands are typically restricted to the few intermittent streams and depressions that carry and can hold water for periods to support emergent vegetation.

3.6. Invasive / Noxious Species

No state-listed noxious or invasive plant infestations were found by reviewing inventory maps, databases, or during field investigations. Cheatgrass (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) 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. Recent 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 and cheat grass infestations increase the likelihood and severity of wildfire, Balch, 2013.

3.7. 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. BLM evaluated impacts to wildlife resources and recommended project modifications where wildlife issues arose. BLM also consulted databases 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 occur or are likely to occur in the project area. Wildlife and plant surveys for BFO species of management concern were conducted in the 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).

3.7.1. 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. Mule deer and pronghorn yearlong ranges occur in the project area. Yearlong range provides general use and support of a population of animals on a year-round basis. Elk are transient in the project area. There are no designated elk or white-tailed deer seasonal ranges in the project area. There are no crucial big game habitats, parturition areas, or migration routes in or within two miles of the project area. Elk crucial winter range occurs approximately 17.5 miles east of the project area; and crucial winter yearlong range occurs more than 61 miles northwest of the project area. Mule deer crucial winter range and crucial winter yearlong ranges occur approximately 50 miles southwest of the project area. White-tailed deer crucial winter and crucial winter yearlong ranges occur more than 65 miles northeast of the project area. Pronghorn crucial winter year long range occurs approximately 35 miles 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.

3.7.2. Small Game Birds

The PRB FEIS discussed the affected environment for plains sharp-tailed grouse (*Tympanuchus phasianellus jamesi*), pp. 3-148 to 3-150. BLM discusses the plains sharp-tailed grouse in this document because the public identified specific concerns for this species during the scoping process for the PRB

FEIS. No sharp-tailed grouse leks were found in the proposal area or within 1 mile of the project area boundary (HWA 2012). This species is not expected to occur in the project area.

3.7.3. Non-Game

3.7.3.1. Raptors

The PRB FEIS discussed the affected environment for raptors, pp. 3-141 to 3-148. Species occurring 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*). 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. Ground and aerial raptor nest surveys in 2012 identified 57 raptor nests (35 ferruginous hawk, 7 unknown species, 6 golden eagle, 6 red-tailed hawk, 2 Swainson's hawk, and 1 great-horned owl) in the project area and the associated 0.5-mile buffer surrounding the area (HWA 2012). Forty-five of the 57 identified raptor nests were inactive. HWA identified 8 active nests in the proposal area, including 4 red-tailed hawk nests, 2 golden eagle nests, 1 ferruginous hawk nest, and 1 great-horned owl. Twelve nests occur within 0.5 miles of a proposed well pad (Table A.2), of which 2 were active red-tailed hawk nests in 2012 (HWA Nest ID#s 221 and 808).

3.7.3.2. Migratory Birds

The PRB FEIS discussed the affected environment for migratory birds, pp. 3-150 to 3-153. A variety of migratory birds may occur in the proposal area during the year. Migratory birds are birds that migrate for breeding and foraging at some point in the year. 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 to fulfill obligations under the Migratory Bird Treaty Act (MBTA). The MBTA (and Bald and Golden Eagle Protection Act (BGEPA)) are strict liability statutes so require no intent to harm migratory birds through prosecuting a taking. Recent prosecutions or settlements in Wyoming, and the west, cost companies millions of dollars in fines and restitution (which was usually retrofitting power lines to discourage perching to minimize electrocution or shielding ponds holding toxic substances). BLM encourages voluntary design features and conservation measures supporting migratory bird conservation, in addition to appropriate restrictions.

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	

Habitats occurring near the proposed wells include sage-brush steppe grasslands, mixed grass prairie, and mature deciduous trees. As described in Section 3.3, Vegetation and Ecological Sites, the proposed pad #s 264, 265, 266, 269, 273, and 274 are the proposed well pads with migratory bird habitat conducive for sage-brush obligate birds (Brewer's sparrow, sage thrasher, loggerhead shrike). The other proposed well pads are in pasture grasses or adjacent to tilled agricultural fields. Many species that are of high

management concern use these 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 FWS's Birds of Conservation Concern (BCC 2008) identifies species of all migratory nongame birds that, without additional conservation actions, are likely to be candidates for listing under the Endangered Species Act. Species in this list that potentially occur in the project area are: Brewer's sparrow, sage thrasher, loggerhead shrike, short-eared owl, and grasshopper sparrow. The BLM Wyoming Sensitive Species list identified 3 of the species. The WGFD Wyoming Bird Conservation Plan (Nicholoff 2003) identified 3 groups of Wyoming's high-priority bird species: Level I – those that clearly need conservation action, Level II – species where the focus should be on monitoring, rather than active conservation, and Level III – species that are not of high priority but are of local interest. Species likely occurring in the project area are in Table 3.5. Several migratory species are also BLM special status (sensitive) species (SSS). Those known or suspected of occurring in the project area include Baird's sparrow, Brewer's sparrow, ferruginous hawk, loggerhead shrike, long-billed curlew, mountain plover, sage sparrow, sage thrasher, and Western burrowing owl.

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

3.7.4.1. 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 BFO'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.

3.7.4.1.1. 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.

3.7.4.1.2. Candidate: Greater Sage-Grouse (GS)

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 specificity to management policies. Wyoming has identified GSG core areas that contain important nesting or breeding grounds. The nearest designated core area (known as Thunder Basin) is approximately 20 miles to the east of the proposal area. One lek (BLM ID: 160 Acre) exists in the proposal area; approximately 2.2 miles north northeast of Flatbow Well Pad #266. Aerial surveys conducted in 2012 did not identify any GSG at this lek (HWA 2012). This lek is presumed to be inactive, based on the results of surveys conducted in 2012 and BLM's Sage Grouse Application Database

(SGAD) The Spring Creek Lek is 1.7 miles to the east of the project area. This lek was also determined to be inactive during 2012 lek surveys. No new or previously undiscovered leks were identified during aerial surveys in or within 2 miles of the project area (HWA 2012).

3.7.4.2. 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. Table A.1, below, includes 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 report. Wyoming BLM annually updates its list of SSS to focus management to maintain habitats to preclude listing as a threatened or endangered species. The PRB FEIS discusses impacts to sensitive species, pp. 4-257 to 4-265. Wyoming BLM updates SSS on its website: http://www.blm.gov/wy/st/en/programs/Wildlife.html.

3.7.4.2.1. Bald Eagle

The PRB FEIS discussed the affected environment for the bald eagle, p. 3-175. The eagle was a threatened species under the ESA when the BLM approved the PRB FEIS. FWS removed the eagle from the endangered species list on August 8, 2007. The bald eagle is protected under the Bald and Golden Eagle Protection Act (BGEPA) and the MBTA. No suitable nesting or roosting habitats exist in the proposal area (HWA 2012).One winter roosting site is in the proposal area - on Bates Creek (Sections 24 and 25, T41N, R73W). Two other bald eagle winter roost sites are within 2 miles of the project. Based on the results of recent winter surveys, the Bald Eagle occurs in the vicinity of the proposal area during the winter (presumably foraging for terrestrial prey and carrion or roosting) (HWA 2012).

3.7.4.2.2. 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 species typically nests on the ground in grass and sageshrub lands, increasing its exposure to ground predators. In the PRB, this hawk inhabits grasslands and sage shrublands. This species typically nests on the ground, increasing its exposure to ground predators. The proposed project area includes suitable nesting and foraging habitats for this species. Thirty-five ferruginous hawk nests were identified in the project area and associated 0.5 mile buffer in 2012 (HWA 2012). Three of these nests were active in 2012, of which, 1 (HWA Nest ID# 791) occurs in the proposal area (more than 0.5 miles from a proposed well pad).

3.7.4.2.3. 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 at the time BLM approved the PRB FEIS. FWS withdrew the proposal withdrew their on-and-off proposal in 2011. BLM identified no suitable habitat in the project area during surveys in 2010, 2011, and 2012. One potentially suitable habitat was identified in the south of the project area (HWA 2012). The mountain plover was not detected in the project area during surveys in 2012 (HWA 2012).

3.7.4.2.4. 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.

3.7.4.2.5. Brewer's Sparrow

The PRB FEIS discussed the affected environment for the Brewer's sparrow, p. 3-200. Sagebrush grasslands in the project area potentially provide suitable nesting habitat for the Brewer's sparrow. This

species is relatively abundant and widespread in Wyoming, with its distribution closely matching that of sagebrush communities throughout the state. This species has the potential to occur in the project area.

3.7.4.2.6. Loggerhead Shrike

The PRB FEIS discussed the affected environment for the loggerhead shrike, p. 3-187. Short- and mixed-grass prairies and shrublands that exist in the project area may provide suitable habitats for the loggerhead shrike. This species breeds throughout Wyoming and is expected to occur in the project area.

3.7.4.2.7. Sage Sparrow

The PRB FEIS discussed the affected environment for the sage sparrow, p. 3-200. The sage sparrow is a common summer resident in Wyoming, occurring in grassland and shrubland habitats. This species may occur in suitable grassland and shrubland habitats that exist in the project area.

3.7.4.2.8. Sage Thrasher

The PRB FEIS discussed the affected environment for the sage thrasher, p. 3-199. Sagebrush shrublands that exist in the project area may provide suitable nesting habitat for this species. The sage thrasher has the potential to occur in the project area.

3.8. Aquatics

The PRB FEIS discussed the aquatic ecosystem and fishery, pp. 3-153 to 3-166. The project area occupies portions of 3 watersheds including, noted, above. Lower Bates, Little Bates, and Spring Creeks are prominent ephemeral drainages in the proposal area. While several other smaller creeks and unnamed 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.

3.9. Cultural Resources, National Register of Historic Places (NRHP) Eligibility

In accordance with Section 106 of the National Historic Preservation Act, BLM must consider impacts to historic properties (sites that are eligible for or listed on the NRHP). For an overview of cultural resources that are generally found in BFO, refer to the *Draft Cultural Class I Regional Overview, Buffalo Field Office* (BLM, 2010). A Class III (intensive) cultural resource inventory (BFO project no. 70120090 and 70130027) was performed in order to locate specific historic properties which may be impacted by the proposal. The following resources are in or near the proposed project area.

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

Site #	Site Type	Eligibility	Site #	Site Type	Eligibility
48CA4836	Historic Homestead	Not Eligible	48CA4868	Reno to Salt Creek Road	Not Eligible
48CA301	Historic Rock Alignment and Debris Scatter	Not Eligible	48CA7148	Historic Depression and Prehistoric Lithic Scatter	Not Eligible

4. ENVIRONMENTAL EFFECTS

BLM analyzed the no action alternative as Alternative 3 in the PRB FEIS and it subsequently received augmentation of the effects analysis in this EA through the analysis of mineral development projects, their approval, and construction; 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 139 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 133 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.

Alternative B was selected as the preferred alternative and is described below.

4.1. Air Quality

4.1.1. Direct and Indirect Effects

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.

4.1.2. Cumulative Effects

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

4.1.3. Mitigation Measures

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

4.1.4. Residual Effects

The BLM anticipates no residual effects.

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 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, clayey, and sandy ecological site seed mix for the Ballista-Flatbow project based on soil map unit types, the area's dominant ecological sites, and mixing of soil horizons in disturbances. The BLM will evaluate reclamation success using the requirements in the BLM State Wide Reclamation Policy, Appendix B, below.

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 throughout the project area (map symbols 130, 139, 140, 157, 158, 159, 160, 170, 171, 188, 193, 213, and 221). Areas susceptible to erosion would be stabilized and reclaimed, as described in the 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 based on effective project design so it recommends no mitigation to those soils. EOG and BLM should apply the following mitigation to reduce impacts to soils and vegetation from surface disturbance:

- To protect erodible soils, all roads 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.

Flatbow well #s 001-25H and 200-25H (Pad 264): The identified residual effects associated with the approval of the 001-25H and 200-25H wells are:

1. The area that would be impacted by the proposed wells includes open range. Spring Creek and two unnamed drainages, upstream from Spring Creek, are crossed by the existing two-track road. These drainages are relatively broad bottomed and well vegetated. Sediment that does reach the drainage bottom should be kept in check by relatively stable grassy bottoms. This two-track road would be crossed by proposed access roads to well pad 265.
2. The majority of the access road to pad # 264 follows an existing two-track road that would be stabilized as part of implementation of the proposed action.

Flatbow well #s 002-25H and 201-25H (Pad 265): The identified residual effects associated with the approval of the 002-25H and 201-25H wells are:

1. The area that would be impacted by the proposed wells includes open range. The access to this pad is shared by pad # 264.
2. The majority of the access road to pad # 265 follows an existing two-track road that would be stabilized as part of implementation of the proposed action.

Flatbow well #s 003-26H, 004-26H, 202-26H and 203-26H (Pad 266): The identified residual effects associated with the approval of the 003-26H, 004-26H, 202-26H and 203-26H wells are:

1. The area that would be impacted by proposed wells includes open range. Little Bates Creek and one unnamed drainage to Little Bates Creek would be crossed by the existing two-track. Little Bates Creek is relatively broad bottomed and well vegetated. The majority of the access to this well pad is via an existing two-track road that would require upgrading.

2. The majority of the access road to well #s 003-26H, 004-26H, 202-26H and 203-26H follows an existing two-track road that would require upgrading and would be stabilized as part of implementation of the proposed action.

Flatbow well #s 006-34H, 007-34H, 205-34H and 206-34H (Pad 268): The identified residual effects associated with the approval of the 006-34H, 007-34H, 205-34H and 206-34H wells are:

1. The area that would be impacted by proposed wells includes open range. The initial portions of the access road are shared by the access to pad 266. No drainages would be crossed to access this pad.
2. The majority of the access road to well #s 006-34H, 007-34H, 205-34H and 206-34H follows an existing two-track road that would require upgrading and would be stabilized as part of implementation of the proposed action.

Ballista well #s 001-02H and 200-02H (Pad 269): The identified residual effects associated with the approval of the 001-02H and 200-02H wells are:

1. The area that would be impacted by proposed wells includes open range. No drainages would be crossed to access this pad.
2. The majority of the access road to well #s 001-02H and 200-02H follows an existing two-track road that would require upgrading and would be stabilized as part of the implementation of the proposed action.

Ballista well #s 002-10H and 201-10H (Pad 270): The identified residual effects associated with the approval of the 002-10H and 201-10H wells are:

1. The area that would be impacted by proposed wells includes open range. Four unnamed drainages to Little Bates Creek would be crossed by the existing two-track. Portions of the access road are shared by pad #s 271 and 272.
2. The majority of the access road to well #s 002-10H and 201-10H follows an existing two-track road that would require upgrading and would be stabilized as part of implementation of the proposed action.

Ballista well #s 003-1003H, 004-10H, 202-1003H and 203-10H (Pad 271): The identified residual effects associated with the approval of the 003-1003H, 004-10H, 202-1003H and 203-10H wells are:

1. The area that would be impacted by proposed wells includes open range. One unnamed drainage to Little Bates Creek would be crossed by the existing two-track. Portions of the access road are shared by pad #s 270 and 272.
2. The majority of the access road to well #s 003-1003H, 004-10H, 202-1003H and 203-10H follows an existing two-track road that would require upgrading and would be stabilized as part of implementation of the proposed action.

Ballista well #s 005-11H, 006-11H, 204-11H and 205-11H (Pad 272): The identified residual effects associated with the approval of the 005-11H, 006-11H, 204-11H and 205-11H wells are:

1. The area that would be impacted by proposed wells includes open range. One unnamed drainage to Little Bates Creek would be crossed by the existing two-track. Portions of the access road are shared by pad #s 270 and 271.
2. The majority of the access road to well #s 005-11H, 006-11H, 204-11H and 205-11H follows an existing two-track road that would require upgrading and would be stabilized as part of implementation of the proposed action.

Ballista well #s 007-11H, 008-11H, 206-11H and 207-11H (Pad 273): The identified residual effects associated with the approval of the 007-11H, 008-11H, 206-11H and 207-11H wells are:

1. The area that would be impacted by proposed wells includes open range. No drainages would be crossed by the existing two-track.

2. The majority of the access road to well #s 007-11H, 008-11H, 206-11H and 207-11H follows an existing two-track road that would require upgrading and would be stabilized as part of implementation of the proposed action.

Ballista well #s 009-12H, 010-12H, 208-12H and 209-12H (Pad 274): The identified residual effects associated with the approval of the 009-12H, 010-12H, 208-12H and 209-12H wells are:
1. The area that would be impacted by proposed wells includes open range. No drainages would be crossed by the existing two-track.
2. The majority of the access road to well #s 009-12H, 010-12H, 208-12H and 209-12H follows an existing two-track road that would require upgrading and would be stabilized as part of implementation of the proposed action.

Ballista well #s 011-01H, 012-01H, 210-01H and 211-01H (Pad 275): The identified residual effects associated with the approval of the 011-01H, 012-01H, 210-01H and 211-01H wells are:
1. The area that would be impacted by proposed wells includes open range. A portion of Little Bates Creek would be crossed by the existing two-track. Little Bates Creek is relatively broad bottomed and well vegetated.
2. The majority of the access road to well #s 011-01H, 012-01H, 210-01H and 211-01H follows an existing two-track road that would require upgrading and would be stabilized as part of implementation of the proposed action.

Ballista well #s 013-13H and 212-13H (Pad 276): The identified residual effects associated with the approval of the 013-13H and 212-13H wells are:
1. The area that would be impacted by the proposed wells includes open range. No drainages would be crossed by the existing two-track.
2. The majority of the access road to wells # 013-13H and 212-13H follows an existing two-track road that would require upgrading and would be stabilized as part of implementation of the proposed action.

Ballista well #s 014-13H and 213-13H (Pad 277): The identified residual effects associated with the approval of the 014-13H and 213-01H wells are:
1. The area that would be impacted by the proposed wells includes open range. No drainages would be crossed by the existing two-track.
2. The majority of the access road to well #s 014-13H and 213-01H follows an existing two-track road that would require upgrading and would be stabilized as part of implementation of the proposed action.

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). An estimated 139 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 area. Grasses and forbs are expected to re-establish in 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 while vegetation re-establishes.

Impacts to soil resources in the proposal 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 as the result of 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 within 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 based on the thin layer of organic and biological material available in 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 most optimal seeding window of early to late fall when possible. 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. EOG 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"), 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, Ballista-Flatbow 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 which contain native grasses and forbs could restore disturbed areas to properly 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 administered by the BLM and therefore BLM developed a site specific seed mix for the access corridors for the proposed project. All sandy ecological sites on the property 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 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 unknown 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 to obtain 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 except for water and oil tanks. All mixing would occur subsurface 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.

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 will ensure that ground water will not be adversely impacted by well drilling and completion. The operator will run surface casing to a depth to 2000 feet, total vertical depth to protect shallow aquifers including coal zones. The Fox Hills formation in this area occurs at a depth of between 6301 and 6607 feet below ground surface. The operator included additional protection for this aquifer in the casing program. The casing will be cemented to a point above the top of the formation to insure isolation. The cement top will be logged to insure proper protection.

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

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.

4.4.1.3. 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 will ensure that ground water will 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 proposal. The access roads that would be constructed across Little Bates and Spring Creeks and associated tributaries 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 Little Bates and Spring Creeks, though they would be minor with implementation of the mitigation. These and other efforts intended to reduce potential impacts from runoff, sedimentation, and erosion are described in the Stormwater Pollution Prevention Plan (SWPPP).

4.4.2.2. Cumulative Effects

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.

4.4.2.3. 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.

4.4.2.4. Residual Effects

BLM anticipates no residual effects.

4.5. Wetland/Riparian

4.5.1. Direct and Indirect Effects

There are at least 84 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. 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 at each drainage crossing will further reduce the potential for indirect impacts to wetlands and riparian areas.

4.5.2. Cumulative Effects

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.

4.5.3. Mitigation Measures

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

4.5.4. Residual Effects

BLM anticipates no residual effects.

4.6. Invasive Species

4.6.1. 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): using and increasing the frequency of their use as necessary; using preventative practices; and providing education to combat proliferation. Cheatgrass and to a lesser extent, Japanese brome 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.

4.6.2. 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.

4.6.3. 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.

4.6.4. 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.

4.7. Fish and Wildlife

4.7.1. 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.

4.7.2. Small Gam (Birds and Mammals): Plains Sharp-tailed Grouse

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, pp. 4-221 to 4-226. BLM proposes no mitigation and anticipates no residual impacts.

4.7.3. Non-Game

4.7.3.1. Raptors

4.7.3.1.1. 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 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 associated with the 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 (spatial) buffer for nesting raptors. A biological buffer is a combination of distance and visual screening that provides nesting raptors with security such that they will not be flushed by routine activities. All proposed wells and associated infrastructure occurring within 0.5 miles of documented raptor nests are in Table A.2, below. Additionally, the FWS was consulted and asked to provide their recommendations regarding minimizing impacts to nesting raptors. The FWS recommended a 1 mile disturbance buffer for known active nests occupied by nesting pairs of golden eagles and ferruginous hawks. The FWS also recommends a 0.5mile disturbance buffer for known active raptor nests occupied by nesting pairs of red-tailed hawks.

The BLM and EOG reduced impacts to nesting raptors by adjusting well and infrastructure placement out of line- of- sight from the nest. With the placement of the wells out of line- of -sight from the nest, as well

as a 0.5-mile radius timing limitation during the breeding season around active raptor nests, it is likely the nest will remain productive. The following were changes made as a result of the onsite review:

- Well Pad #270: The position and layout of this well pad was adjusted so as to avoid a nearby drainage and so the well pad would remain out of direct view of an active red-tailed hawk nest (HWA Nest ID# 808) 0.5 miles to the south. A 0.5-mile timing limitation stipulation would be applied to this pad.
- Well Pad #274: The position and layout of vertical storage tanks and other on-pad facilities may be positioned to obscure the line of sight from an active red-tailed hawk nest (HWA Nest ID# 221) located to the northeast of this well pad. A timing limitation stipulation would also be applied.
- Well Pad #275: The position and layout of vertical storage tanks and other on-pad facilities may be positioned to obscure the line of sight from an active red-tailed hawk nest (HWA Nest ID# 221) located to the west of this well pad. A timing limitation stipulation would also be applied.

4.7.3.1.2. Cumulative Effects

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

4.7.3.1.3. 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).

4.7.3.1.4. 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 (disruptive activity that can last from several days to weeks) associated with completion activities, maintenance actions, or the additional traffic and human activity associated with operations during breeding/nesting season.

4.7.3.2. Migratory Birds

4.7.3.2.1. Direct and Indirect Effects

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

Habitat disturbance and disruptive activities (i.e. drilling, construction, completion, operations, and maintenance) resulting from implementation of the project is likely to affect migratory birds in the entire area. Native habitats would be lost directly with the construction of well pads, access roads, and overhead power lines. Surface disturbing activities that occur in the nesting season may kill migratory birds. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Pad construction, drilling, and to a lesser degree production, would displace edge-sensitive migratory birds from otherwise suitable habitat adjacent to the well pad. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003). Habitat fragmentation would result in more than just a quantitative loss in the total area of habitat available; the remaining habitat area would also be qualitatively altered (Temple and Wilcox 1986). Ingelfinger and Anderson (2004) identified that the density of breeding

Brewer's sparrows declined by 36% and breeding sage sparrows declined by 57% within 100 meters of dirt roads in a natural gas field. Effects occurred along roads with light traffic volume (less than 12 vehicles per day). The increasing density of roads constructed in developing natural gas fields exacerbated the problem creating substantial areas of impact where indirect habitat losses through displacement were much greater than the direct physical habitat losses.

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

During the onsites, the BLM biologist identified suitable nesting habitat present for several BLM sensitive sagebrush obligates. Construction of the proposed well pads and associated infrastructure could remove habitat for BLM sensitive migratory birds, and may destroy unidentified eggs.

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

Heater treaters, and similar facilities with vertical open-topped stacks or pipes, can attract birds. Facilities without exclusionary devices on these stacks and pipes pose a mortality risk. Once birds enter the stack, escape is difficult and the bird may become trapped (U.S. v. Apollo Energies Inc., 611 F.3d 679 (10th Cir. 2010); see also Colorado Oil and Gas Commission, Migratory Bird Policy, accessed February 13, 2012).

4.7.3.2.2. Cumulative Effects

The cumulative effects associated with alternative B are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, p. 4-235.

4.7.3.2.3. Mitigation Measures

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

BLM provided some level of protection for migratory bird nesting through timing limitations applied to CBNG plans of development for GSG and raptor nesting. Many CBNG projects (consisting of multiple

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

Nesting in Brewer's sparrows (a BLM SSS) typically occurs mid-May to mid-July. Some young fledge in late July. Sage thrashers (BLM sensitive species) may lay a second clutch of eggs as late as mid-July. Lark sparrows in northern latitudes lay eggs from early May to mid-July. GSG timing limitations on surface disturbing activities will mitigate impacts to nesting migratory birds from March 15 to June 30. However, several species of birds, listed above, are likely to still have eggs or nestlings into July. BLM biologists observed active Brewer's sparrow nests containing eggs during the last week of June. Only a percentage of known nests are active any given year, so the protections for migratory birds from June 30 to July 31 will depend on how many raptor and mountain plover nests are active. The least restrictive measures (in this case only applying GSG timing limitations) are inadequate to protect all nesting migratory birds that may inhabit the project area.

To reduce the likelihood of a "take" under the MBTA, the BLM biologist recommends that pad construction (vegetation removal) for pad #s 264, 265, 266, 269, 273, and 274 occur outside of the breeding season for the greatest quantity of BLM sensitive passerines (May 1- July 31) where suitable nesting habitat for sagebrush obligates is present. This restriction would apply to habitat removal, unless a pre-construction nest search (within approximately 10 days of construction planned May 1-July 31) is completed. If surveys will be conducted, the operator will coordinate with BLM biologists to determine protocol. The nest search will consist of areas where vegetation will be removed or destroyed. The BLM recommends well pads and associated infrastructure occurring in sagebrush habitats have timing limitations applied for well pad construction during the nesting season for sagebrush obligate passerines (May 1 to July 31).

Timing limitations for GSG (March 15 to June 30), active raptor nests (Well Pads 270, 274, and 275; Feb 1 to July 31), and mountain plover nesting seasons (March 15 to July 31) all begin prior to timing limitations for sagebrush obligates, and thus may provide additional protection where migratory bird nesting periods and habitats overlap.

The BLM also recommends that measures are taken to ensure that migratory birds are excluded from all facilities that pose a mortality risk, including, but not limited to, heater treaters, flare stacks, secondary containment, and standing water or chemicals where escape may be difficult or hydrocarbons or toxic substances are present. To minimize these effects, the operator will equip all open-top pits, tanks, and pipes containing hydrocarbons with nets, screens, or other avian exclusion devices to prevent injury or death to migratory birds, as described in the project-specific Surface Use Plan of Operations.

4.7.3.2.4. Residual Effects

If restrictions on habitat removal, or clearance surveys, are not applied, the BLM would not be in conformance with the MBTA, the BLM-FWS MOU, or BLM IM No. 2013-005. If the restriction on habitat removal is applied, it is unlikely that active nests would be destroyed, as most nestlings would

have fledged by August 1. Nests initiated after the first week in July may be destroyed by construction after August 1st. Migratory birds nesting adjacent to the well pad or road may be disturbed by construction and production activities. A timing limitation does nothing to mitigate loss and fragmentation of habitat. Suitability of the project area for migratory birds would be negatively affected based on habitat loss and fragmentation and proximity of human activities associated with oil and gas development.

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

4.8.1. 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.

4.8.2. Candidate: Greater Sage Grouse (GSG)

Implementation of Alternative B would not have a 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 (well pad #247). The intent of this timing restriction is to decrease the likelihood that GSG will avoid these areas and increase habitat quality by reducing noise and human activities during the breeding season. 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 would be negatively affected as the result of habitat loss and fragmentation and proximity of human activities associated with fluid mineral development.

4.8.3. Special Status (Sensitive) Species (SSS)

4.8.3.1. Bald Eagle

The PRB FEIS discussed the direct and indirect impacts to the bald eagle, pp. 4-251 to 4-253. The proposal will not impact active nests as there are none. Project-related human presence and activity has the potential to disturb or displace wintering, roosting, and foraging bald eagles. The PRB FEIS discussed the cumulative effects, pp. 4-251 to 4-253. In addition to federal oil and gas development, 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 well 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.

4.8.3.2. 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 ferruginous hawk. The magnitude and duration of potential effects would be ameliorated with application of the 0.5-mile timing limitation stipulation.

The PRB FEIS discussed the cumulative effects, p. 4-273. BLM proposes no further mitigation for this species and anticipates no residual effects.

4.8.3.3. 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.

4.8.3.4. Western Burrowing Owl

The PRB FEIS discussed direct and indirect effects on the western burrowing owl, p. 4-262. In addition to the federal development, there will be fee development associated with the project that will have similar impacts on 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 owl productivity through a reduction in nest site availability. Based on no known 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 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 owl and may reduce the quality of adjacent habitats for this species, regardless of the timing of their construction.

4.8.3.5. Brewer's Sparrow

The PRB FEIS discusses impacts to sensitive species on pp. 4-257 to 4-265. Additional impacts are described in the Migratory Birds section of this EA. Cumulative impacts to the Brewer's sparrow, and other sensitive species, was described in the PRB FEIS p. 4-273. Raptor and GSG timing limitations on surface disturbing activities will also serve to mitigate some impacts to nesting Brewer's sparrows. To ensure compliance with the MBTA, the BLM recommends that pad construction occur outside of the migratory bird breeding season (May 1 – July 31). The BLM also recommends that measures are taken to ensure that migratory birds are excluded from all facilities that pose a mortality risk, including, but not limited to, heater treaters, flare stacks, and secondary containment where escape may be difficult or hydrocarbons or toxic substances are present. Timing limitations will apply to the entire project. It is unlikely that active nests will be destroyed by construction activities, as most nestlings will have fledged by the beginning of August. Nests initiated after the first week in July may be destroyed by construction after August 1st. Migratory birds nesting adjacent to the well pad or road may be disturbed by construction and production activities. A timing limitation does nothing to mitigate loss and fragmentation of habitat. Suitability of the project area for Brewer's sparrows will be negatively affected due to habitat loss, fragmentation and proximity of human activities from oil and gas development.

4.8.3.6. Loggerhead Shrike

The PRB FEIS discusses impacts to sensitive species on pp. 4-257 to 4-265. Additional impacts are described in the Migratory Birds section of this EA. Cumulative impacts to this species, and other sensitive species, are discussed in the PRB FEIS on p. 4-273. Raptor and GSG timing limitations on surface disturbing activities will also serve to mitigate some impacts to nesting Loggerhead Shrikes. To ensure compliance with the MBTA, the BLM recommends that pad construction occur outside of the migratory bird breeding season (May 1 – July 31). The BLM also recommends that measures are taken to ensure that migratory birds are excluded from all facilities that pose a mortality risk, including, but not limited to, heater treaters, flare stacks, and secondary containment where escape may be difficult or hydrocarbons or toxic substances are present. Timing limitations will apply to the entire project. It is unlikely that active nests will be destroyed by construction activities, as most nestlings will have fledged

by the beginning of August. Nests initiated after the first week in July may be destroyed by construction after August 1st. Migratory birds nesting adjacent to the well pad or road may be disturbed by construction and production activities. A timing limitation does nothing to mitigate loss and fragmentation of habitat. Suitability of the project area for loggerhead shrikes will be negatively affected due to habitat loss, fragmentation and proximity of human activities from oil and gas development.

4.8.3.7. Sage Sparrow

The PRB FEIS discusses impacts on the Sage sparrow and other sensitive species on pp. 4-257 to 4-265. Additional impacts are described in the Migratory Birds section in this EA. Cumulative impacts to the Sage sparrow and other sensitive species are discussed in the PRB FEIS on p. 4-273. Raptor and GSG timing limitations on surface disturbing activities will also serve to mitigate some impacts to nesting Sage sparrows. To ensure compliance with the MBTA, the BLM recommends that pad construction occur outside of the migratory bird breeding season (May 1 – July 31). The BLM also recommends that measures are taken to ensure that migratory birds are excluded from all facilities that pose a mortality risk, including, but not limited to, heater treaters, flare stacks, and secondary containment where escape may be difficult or hydrocarbons or toxic substances are present. Timing limitations will apply to the entire project. It is unlikely that active nests will be destroyed by construction activities, as most nestlings will have fledged by the beginning of August. Nests initiated after the first week in July may be destroyed by construction after August 1st. Migratory birds nesting adjacent to the well pad or road may be disturbed by construction and production activities. A timing limitation does nothing to mitigate loss and fragmentation of habitat. Suitability of the project area for Sage sparrows will be negatively affected due to habitat loss, fragmentation and proximity of human activities associated with oil and gas development.

4.8.3.8. Sage Thrasher

The PRB FEIS discusses impacts on the Sage thrasher and other sensitive species on pp. 4-257 to 4-265. Additional impacts are described in the Migratory Birds section of this EA. Cumulative impacts on the Sage thrasher and other sensitive species are discussed in the PRB FEIS on p. 4-273. Raptor and GSG timing limitations on surface disturbing activities will also serve to mitigate some impacts to nesting Sage thrashers. To ensure compliance with the MBTA, the BLM recommends that pad construction occur outside of the migratory bird breeding season (May 1 – July 31). The BLM also recommends that measures are taken to ensure that migratory birds are excluded from all facilities that pose a mortality risk, including, but not limited to, heater treaters, flare stacks, and secondary containment where escape may be difficult or hydrocarbons or toxic substances are present. Timing limitations will apply to the entire project. It is unlikely that active nests will be destroyed by construction activities, as most nestlings will have fledged by the beginning of August. Nests initiated after the first week in July may be destroyed by construction after August 1st. Migratory birds nesting adjacent to the well pad or road may be disturbed by construction and production activities. A timing limitation does nothing to mitigate loss and fragmentation of habitat. Suitability of the project area for Sage thrashers will be negatively affected due to habitat loss, fragmentation and proximity of human activities associated with oil and gas development.

4.9. Aquatics

The project, being semi-closed loop, has no direct and indirect effects. There would be no direct discharge under Alternative B. Onsite and managed containment tanks would 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 and anticipates no residual impacts.

4.10. Cultural Resources

4.10.1. Direct and Indirect Effect

BLM policy states that a decision maker's first choice should be avoidance of historic properties (BLM Manual 8140.06(C)). If historic properties cannot be avoided, mitigation measures must be applied to resolve the adverse effect. The proposal will impact non-eligible sites 48CA301, 48CA4836, and

48CA7148. The proposal will not impact historic properties. Following the State Protocol Between the *Wyoming Bureau of Land Management State Director and The Wyoming State Historic Preservation Officer*, Section VI(A)(1) the BLM notified the Wyoming State Historic Preservation Officer (SHPO) on April 23, 2013 that no historic properties exist in the area of potential effect (APE). If any cultural values (sites, features or artifacts) are observed during operation, they will be left intact and the Buffalo Field Manager notified. If human remains are noted, the procedures in Appendix L of the PRB FEIS and ROD must be followed. Further discovery procedures are explained in Standard COA (General)(A)(1).

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. Destruction of any archeological resource results in fewer opportunities to study of past human life-ways, to study changes in human behavior through time, or to interpret 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 may 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. Oil and gas development on split estate often includes construction of infrastructure that does not require permitting by BLM. Project applicants may integrate infrastructure associated with wells draining fee minerals with wells that require federal approval. BLM has no authority over fee actions, 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. Archeological inventories reveal the location of sensitive sites and although the BLM is obligated to protect site location data, information can potentially get into the wrong hands resulting in unauthorized artifact collection or vandalism. 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 any cultural values (sites, features or artifacts) are observed during operation, they will be left intact and the Buffalo Field Manager notified. If human remains are noted, the procedures described in Appendix L of the PRB FEIS and ROD must be followed. Further discovery procedures are explained in Standard COA (General)(A)(1).

4.10.4. Residual Effects

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

5. CONSULTATION 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

List of Preparers (BFO unless otherwise noted)

Position/Organization	Name	Position/Organization	Name
NRS/Team Lead	Meleah Corey	Archaeologist	Clinton Crago
Supervisory NRS	Casey Freise	Wildlife Biologist	Scott Jawors
Petroleum Engineer	Matt Warren	Geologist	Kerry Aggen
NEPA Coordinator	John Kelley	Supervisory NRS	Kathy Brus
Assistant Field Manager	Chris Durham	Assistant Field Manager	Clark Bennett

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Appendix A. Figures and Tables
Figure A.1. Bottom and Surface Hole Locations

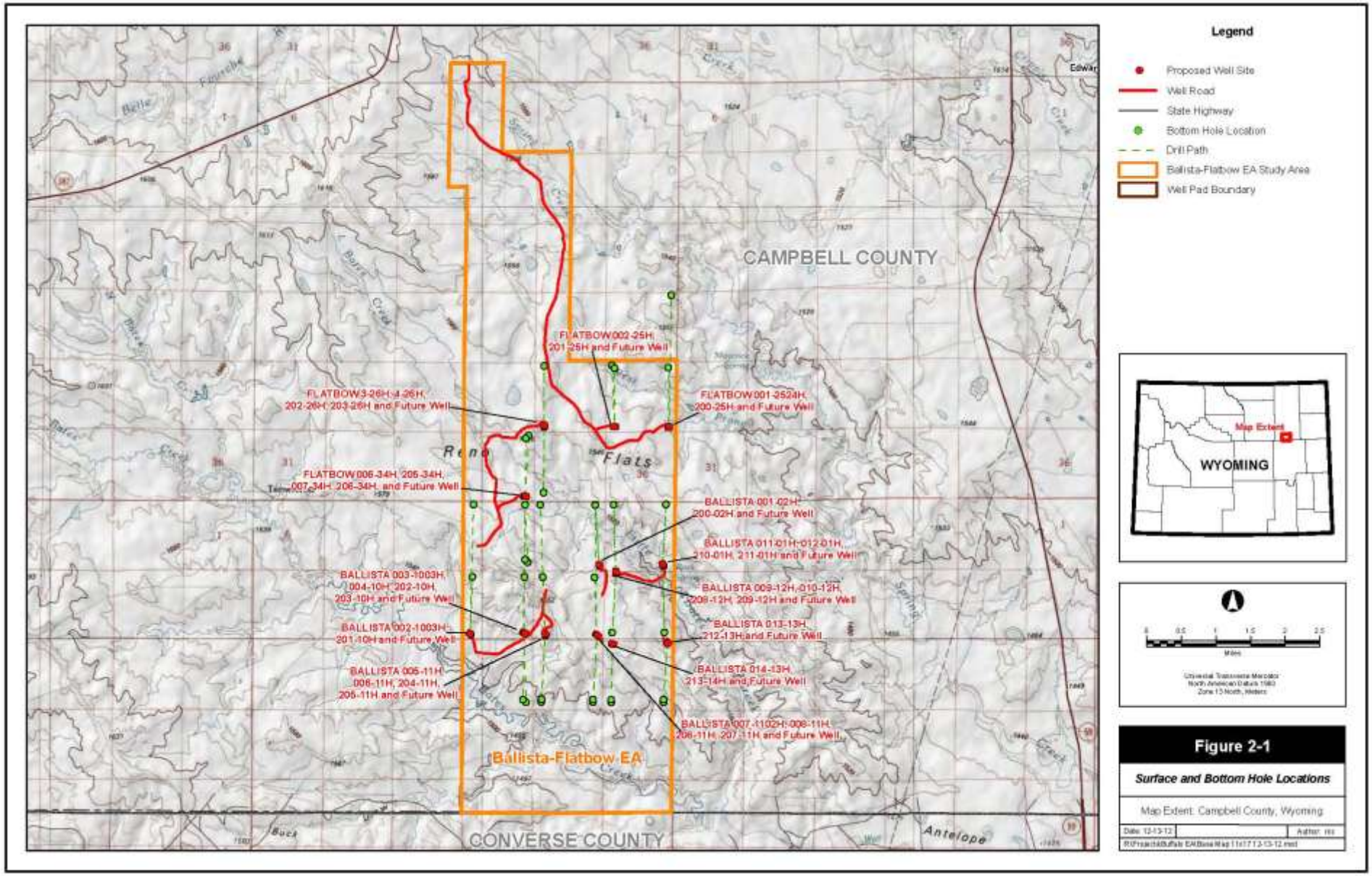

Table A.1. BLM BFO Evaluation of Sensitive Species and Selection for Analysis

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, and beaver ponds; associated with 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*)	Typical breeding habitat includes shallow marshes with islands of emergent vegetation. In Wyoming, most often found in southwestern and southeastern areas of the state.	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. Known to occur and nest within 0.5 miles of the Project Area.	K	MIIH	Known to occur within 0.5 mile of the Project Area. 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.

Table A.1. BLM BFO Evaluation of Sensitive Species and Selection for Analysis

Common Name (Scientific name)	Habitat	Presence	Potential Effects	Rationale/Analyzed
Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*)	Relies on grasslands and shrublands associated with gently sloping terrains.	NP	NI	No suitable habitat and occurrence unlikely. Surveys of the Project Area conducted in 2012 did not identify leks or individuals. Not analyzed.
Mountain Plover (*Charadrius montanus*)	Typically occurs and nests in grassland habitats, particularly associated with vegetation that is relatively shorter than surrounding vegetation (for example, 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*)	Typically associated with thick and dense deciduous vegetation with scrubby 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*)	Known as a nesting resident throughout Wyoming where suitable habitat exists. A sagebrush obligate, associated with sagebrush-steppe habitats associated with gentle slopes and rolling hills.	S	MIIH	May occur in limited sagebrush habitats in the Project Area. Analyzed.
Loggerhead Shrike (*Lanius ludovicianus*)	Basin prairie shrub and montane foothill shrub. Typically nesting in dense vegetation and foraging in more open habitats.	S	MIIH	May occur in potentially suitable habitats that exist in the Project Area. Analyzed.
Brewer's Sparrow (*Spizella breweri*)	A sagebrush obligate. In Wyoming, nesting typically associated with sagebrush habitats.	S	MIIH	Species is common in suitable sagebrush habitats throughout Wyoming. Analyzed.
Sage Sparrow (*Amphispiza belli*)	A sagebrush obligate, occurrence is positively and highly correlated with large stands of dense and tall sagebrush; and negatively associated with the amount of open grassland.	S	MIIH	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				

Table A.1. BLM BFO Evaluation of Sensitive Species and Selection for Analysis

Common Name (Scientific name)	Habitat	Presence	Potential Effects	Rationale/Analyzed
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 and 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 proposed project 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.
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 - 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.

Table A.2. Raptor Nests within 0.5-Mile of the Proposed Ballista-Flatbow Area (HWA 2012)

HWA Nest ID	BLM Nest ID	Species	2012 Status	Nest Condition	Well Pads within 0.5-mile	Distance (miles)	Direction from Well
171	4794	Ferruginous Hawk	Inactive	Fair	---	---	---
172	4795	Ferruginous Hawk	Inactive	Poor	276	0.3	NNE
173	4796	Ferruginous Hawk	Inactive	Good	276	0.3	NE
174	4797	Ferruginous Hawk	Inactive	Remnants	276	0.5	NNE
183	4806	Red-tailed Hawk	Visited	Good	---	---	---
184	4807	Swainson's Hawk	Inactive	Good	276	0.4	SE
187*	4812	Ferruginous Hawk	Inactive	Remnants	---	---	---
188*	4813	Ferruginous Hawk	Inactive	Fair	275	0.5	N
189*	4815	Ferruginous Hawk	Inactive	Good	---	---	---
221*	861	Red-tailed Hawk	Active	Good	274 275	274 – 0.4 275 – 0.2	272 – NE 275 – W
233*	854	Ferruginous Hawk	Inactive	Poor	---	---	---
234*	3736	Swainson's Hawk	Inactive	Good	---	---	---
235*	3737	Golden Eagle	Active	Excellent	---	---	---
236	887	Ferruginous Hawk	Inactive	Gone	---	---	---
238	885	Ferruginous Hawk	Inactive	Remnants	264	0.5	SE
254*	4810	Ferruginous Hawk	Inactive	Gone	---	---	---
255*	4811	Ferruginous Hawk	Inactive	Gone	---	---	---
256*	4814	Golden Eagle	Active	Fair	---	---	---
273*	12710	Golden Eagle	Inactive	Gone	274 275	274 – 0.5 275 – 0.4	274 – SE 275 - SW
278*	12717	Ferruginous Hawk	Inactive	Good	---	---	---
279*	12716	Ferruginous Hawk	Inactive	Good	---	---	---
285	871	Ferruginous Hawk	Inactive	Gone	---	---	---
290*	3738	Red-tailed Hawk	Active	Good	---	---	---
293	876	Ferruginous Hawk	Inactive	Gone	---	---	---
369	808	Golden Eagle	Inactive	Gone	---	---	---
385	5228	Ferruginous Hawk	Inactive	Remnants	---	---	---
386	5229	Ferruginous Hawk	Inactive	Gone	---	---	---
387	5230	Ferruginous Hawk	Inactive	Remnants	---	---	---
388	5231	Ferruginous Hawk	Inactive	Remnants	---	---	---
389*	5232	Ferruginous Hawk	Inactive	Fair	---	---	---
405	6292	Ferruginous Hawk	Active	Excellent	---	---	---
406*	6293	Ferruginous Hawk	Inactive	Remnants	264	0.5	N
416*	863	Unknown Raptor	Inactive	Gone	---	---	---
421*	802	Golden Eagle	Inactive	Gone	---	---	---
422*	804	Golden Eagle	Inactive	Gone	---	---	---
425	789	Ferruginous Hawk	Inactive	Gone	---	---	---
426	794	Ferruginous Hawk	Inactive	Good	---	---	---
427	795	Red-tailed Hawk	Active	Excellent	---	---	---
788	No ID	Ferruginous Hawk	Active	Excellent	---	---	---
789	No ID	Ferruginous Hawk	Inactive	Fair	---	---	---
790	No ID	Ferruginous Hawk	Inactive	Fair	---	---	---
791*	No ID	Ferruginous Hawk	Active	Excellent	---	---	---
794*	No ID	Unknown Raptor	Inactive	Fair	---	---	---

800*	No ID	Ferruginous Hawk	Inactive	Remnants	---	---	---
801*	No ID	Ferruginous Hawk	Inactive	Fair	271 272	271 – 0.5 272 – 0.5	271 – N 272 - NW
802*	No ID	Unknown Raptor	Inactive	Good	---	---	---
803*	No ID	Unknown Raptor	Inactive	Fair	---	---	---
808*	No ID	Red-tailed Hawk	Active	Excellent	270	0.3	S
811*	No ID	Ferruginous Hawk	Inactive	Fair	---	---	---
814*	No ID	Unknown Raptor	Inactive	Good	---	---	---
816*	No ID	Red-tailed Hawk	Active	Good	---	---	---
817*	No ID	Unknown Raptor	Inactive	Good	---	---	---
818*	No ID	Great Horned Owl	Active	Excellent	---	---	---
866*	No ID	Ferruginous Hawk	Inactive	Poor	---	---	---
867*	No ID	Ferruginous Hawk	Inactive	Good	---	---	---
868*	No ID	Ferruginous Hawk	Inactive	Fair	---	---	---
871	No ID	Unknown Raptor	Inactive	Good	270	0.5	W

Appendix B. Terms, Wyoming Reclamation Policy, and Reclamation Plan

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.