DECISION RECORD
SM Energy Company, Trigger Fed 4176-16-21-1FH & Target Fed 4176-17-20-1FH
Environmental Assessment (EA), WY-070-EA14-190
Bureau of Land Management, Buffalo Field Office, Wyoming

DECISION. The BLM approves SM Energy Company: Trigger Fed 4176-16-21-1FH, Target Fed 4176-17-20-1FH gas and oil well applications for permit to drill (APDs) described in Alternative B of the environmental assessment (EA), WY-070-14-190. This approval includes the wells' support facilities.

Compliance. This decision complies with or supports:
- Federal Land Policy and Management Act of 1976 (FLPMA) (43 USC 1701); DOI Order 3310.
- Mineral Leasing Act of 1920 (MLA) (30 U.S.C. 181); including the Onshore Oil and Gas Orders.
- National Environmental Policy Act of 1969 (NEPA) (42 USC 4321).
- National Historic Preservation Act of 1966 (NHPA) (16 USC 470).
- Buffalo and Powder River Basin Final Environmental Impact Statements (FEISs), 1985, 2003, 2011.
- 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.
- Wyoming BLM State Director Review, SDR No. WY-2013-025, Yates Petroleum v. BLM, 2013.

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

Well Site. BLM approves 2 APDs and support facilities:

#	Well Name & #	Twn	Rng	Sec	Qtr	Lease #
1	Trigger Fed 4176-16-21-1FH	41	76	16	NENW	WYW031711
2	Target Fed 4176-17-20-1FH	41	76	17	NENW	WYW147312

Limitations. There are no denials or deferrals. Also see the conditions of approval (COAs) and recommended mitigation measures (RMMS).

THE FINDING OF NO SIGNIFICANT IMPACT (FONSI). Analysis of Alternative B of the EA, WY-070-EA14-190, and the FONSI (incorporated here by reference) found SM Energy's proposal for 2 wells and associated infrastructure 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 APDs for 30 days, received no comments, and then internally scoped them. Since receipt of these APDs BLM received no updated or clarified policies relevant to the APDs.

DECISION RATIONALE. BLM bases the decision authorizing the selected project on:
1. BLM and SM Energy 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 GSG population. The impact of this development cumulatively contributes to the potential for local GSG 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. SM Energy 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. The operator 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. The operator certified it has a surface access agreement.
6. The project is clearly lacking in wilderness characteristics as there is no federal surface.
7. These APDs are pursuant to the Mineral Leasing Act for developing oil or gas and do not satisfy the categorical exclusion directive of the Energy Policy Act of 2005, Section 390 because the site-specific analyses covering the project area required updating.

ADMINISTRATIVE REVIEW AND APPEAL. This decision is subject to administrative review according to 43 CFR 3165. Request for administrative review of this decision must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, no later than 20 business days after this Decision Record is received or considered to have been received. Parties adversely affected by the State Director's decision may appeal that decision to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Field Manager: _____ Date: 4/22/14

FINDING OF NO SIGNIFICANT IMPACT
SM Energy Company, Trigger Fed 4176-16-21-1FH & Target Fed 4176-17-20-1FH
Environmental Assessment (EA), WY-070-EA14-190
Bureau of Land Management, Buffalo Field Office, Wyoming

FINDING OF NO SIGNIFICANT IMPACT (FONSI). Based on the information in the EA, WY-070-EA14-190, 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, 2011 to which the EA tiers; (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, 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 have minor controversy, are not highly uncertain, or do not involve unique or proven 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 no federal surface. No species listed under the Endangered Species Act or their designated critical habitat will be adversely affected. The selected alternative will not have any anticipated effects that would threaten a violation of federal, state, or local law or requirements imposed for the protection of the environment.

ADMINISTRATIVE REVIEW AND APPEAL. This finding is subject to administrative review according to 43 CFR 3165. Request for administrative review of this finding must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, no later than 20 business days after this FONSI is received or considered to have been received. Parties adversely affected by the State Director's finding may appeal that finding to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Field Manager: _____ Date: 4/22/14

ENVIRONMENTAL ASSESSMENT (EA), WY-070-EA14-190
SM Energy Company, Trigger Fed 4176-16-21-1FH & Target Fed 4176-17-20-1FH
Bureau of Land Management, Buffalo Field Office, Wyoming

1. INTRODUCTION

BLM provides an EA fo**r** SM Energy's 2 oil and gas well applications for permit to drill (APDs) from 2 pads. BLM has reduced jurisdiction for these proposals via fee (non-federal) surface overlying fee minerals then draining federal minerals. The horizontal bores end in federal minerals. This proposal is to develop federal minerals from pads on non-federal locations. This site-specific analysis tiers to and incorporates by reference the information and analysis in the Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project (PRB FEIS), WY-070-02-065, 2003, 2011 and the PRB FEIS Record of Decision (ROD) per 40 CFR 1508.28 and 1502.21. One may review these documents at the BLM Buffalo Field Office (BFO) and on our website: http://www.blm.gov/wy/st/en/field_offices/Buffalo.html. These APDs are pursuant to the Mineral Leasing Act for the purpose of exploring or developing oil or gas and do not satisfy the categorical exclusion directive of the Energy Policy Act of 2005, Section 390 because inadequate site-specific analysis covered the project area.

1.1. Background

SM Energy (SME) submitted the APDs on December 31, 2013 to the BFO to produce oil and natural gas from federally managed fluid mineral bearing formations of the PRB, on fee surface.

- September 13, 2013 – November 15, 2013, BLM received 2 notices of staking, posted, assigned, and conducted onsite visits, evaluating and modifying the proposal to minimize environmental impacts.
- January 28, 2013- BFO sent SM Energy deficiencies
- February 26, 2013- BFO received deficiencies

1.2. Need for the Proposed Project

The BLM's need for this project is to meet the management objectives of the Buffalo Resource Management Plan (RMP), 1985, 2001, 2003, and 2011 (to which this EA tiers). BLM must determine how and under what conditions to balance natural resource conservation with allowing APC to exercise lease rights to develop fluid minerals, as described in their APDs associated plans. Conditional fluid mineral development supports the RMP, the Mineral Leasing Act of 1920, the Federal Land Policy Management Act (FLPMA), and other laws and regulations.

1.3. Decision to be Made

The BLM will decide whether or not to approve the proposed development, and if so, under what terms and conditions agreeing with the Bureau's multiple use mandate, environmental protection, and RMP. BLM Washington Office Instruction Memorandum (IM) No. 2009-078 established policy and procedures for processing APDs for horizontal drilling into federal mineral estate from multiple well pads on non-federal locations. Drilling and producing the wells is a federal action. Construction, operation, and reclamation of infrastructure on non-federal land are not federal actions. Drilling and producing mitigation is in the Conditions of Approval for Conventional Application for Permit to Drill.

It is the BLM's responsibility and obligation to analyze the full effects of the federal action, and identify mitigation measures, regardless of the BLM's authority to enforce the mitigation. The BLM needs to identify mitigation measures that would reduce or eliminate the effects of a non-federal action when it is a connected action to the BLM proposed action (see the BLM NEPA Handbook, Section 6.8.2.1.1, Connected Non-federal Actions). Identifying mitigation outside of the BLM's jurisdiction alerts other agencies and landowners that can implement the mitigation. The probability of the other agencies

implementing the mitigation measures is likely to occur, although these agencies may vary specific parameters recommended by the BLM.

1.4. Scoping and Issues

BLM posted the proposed APDs for 30 days and will timely publish the EA, any finding, and decision on the BFO website. This project is similar in scope to other fluid mineral development the BFO analyzed. External scoping is unlikely to identify new issues, as verified with recent fluid mineral EAs that 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 significantly affected resources, 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 receive significant or material affects, 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 in the project area. Project issues include:

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

BLM analyzed the following issues in the PRB FEIS and they do not present a substantial environmental question of material significance to this proposal:

These issues are not present, or minimally so. BLM analyzed them in the PRB FEIS and not in this EA:

Geological resources	Recreation	Wilderness characteristics
Cave and karst resources	Heritage & Visual Resources	Livestock & grazing
Lands & Realty	Paleontological resources	Areas of critical environmental concern
Wilderness characteristics	Transportation & Access	Socio-economic resources
Forest Products	Tribal Treaty Rights	Environmental justice
Mineral resources: locatable, leasable-coal, salable	Fire, fuels management, & rehabilitation	

2. PROPOSED PROJECT AND ALTERNATIVES

2.1. Alternative A – No Action

The no action alternative would deny these APDs requiring the operator to resubmit APDs that comply with statutes and the reasonable measures in the PRB RMP Record of Decision (ROD) in order to lawfully exercise conditional lease rights. The PRB FEIS considered a no action alternative, pp. 2-54 to 2-62. The BLM keeps the no action alternative current using the aggregated effects analysis approach – tiering to or incorporating by reference the analyses and developments approved by the subsequent NEPA analyses for adjacent and intermingled developments to the proposal area.

2.2. Alternative B Proposed Action (Proposal)

Overview. SM Energy Company proposes drilling and developing 2 horizontal oil and gas wells into federal mineral estate from fee surface overlaying fee minerals (the Trigger Federal 4176-16-21-1FH (Trigger) is on state surface. State of Wyoming, Tate Smith, Natural Resource Technician, was consulted regarding the well location and access). The target formation is the Frontier with an approximate depth of

12,000 ft. The proposal is 32 miles West of Wright, Campbell County, Wyoming. The proposal requires the construction of 2 engineered (cut and fill) well pads. The total surface disturbance with these pads, access roads and flowlines will be about 66 acres. Interim reclamation of well pads will restore 12 acres during the production phase (6.5 acres of the original surface disturbance for the well pads remains). These figures include disturbance from the well pads, the spoil and topsoil storage areas, construction equipment, and vehicle disturbance. The access roads will be constructed to meet the standards of the anticipated traffic flow and all-weather requirements. Road construction will include ditching, draining, graveling, and crowning of the roadbed. Pipeline placement will be along the well access road. Construction for buried gas flowlines will include topsoil removal, ditching and spoils placement. See the drilling program with each APD for details on targeted zones, legal descriptions, surface, and bottom holes – summarized at Table 2.1, below.

Table 2.1. Well Name/#/Lease/Location:

#	Well Name & #	Twn	Rng	Sec	Qtr	Lease #
1	Trigger Fed 4176-16-21-1FH	41	76	16	NENW	WYW031711
2	Target Fed 4176-17-20-1FH	41	76	17	NENW	WYW147312

The proposal involves (distances in feet, disturbances in acres):

Activity	Length	Width	Disturbance	Interim Disturbance
Trigger Fed 4176-16-21-1FH constructed pad, tank battery	600	400	9.3	2.7
Access Road	5808	75	10	
Gas pipeline	12,138	45	12.5	
Total Disturbance for this location			32	

NOTE: Length/Width represent working pad dimensions. Acres of disturbance represent the fenced in area of disturbance. For details pertaining to road type and pipeline placement see MSUP.

Activity	Length	Width	Disturbance	Interim Disturbance
Target Fed 4176-17-20-1FH constructed pad, including spoils/tank battery	600	400	9.3	4.0
Access Road	4752	75	8.2	
Gas pipeline	16,130	45	16.6	
Total Disturbance for this location			34	

Drilling, Construction and Production Design Features Include:

- SM Energy anticipates completing construction, drilling and interim reclamation in 2 years. Drilling and construction is year-round in the PRB. Weather may cause delays that rarely last multiple weeks. Timing limitations in the form of conditions of approval (COAs) and/or agreements with surface owners may impose longer temporal restrictions.
- A road network consisting of existing improved roads and construction of roads.
- Potential production facilities for each well will consist of 8-400 bbl tanks, a separator/heater treater, a pumping unit with electric motor, vapor recovery unit (VRU) and possibly a gas separator. All tanks will be 20 feet tall and 12 feet in diameter. An impermeable dike/berm will surround these facilities.
- Water used for drilling, cementing and completion work will be obtained from an existing water well (Iberlin 23-9-4176 Stock Reservoir, permit #P190240S). Drilling and completion operations will require approximately 125,000 bbls per well. Flowback water will be disposed in a Wyoming

- Department of Environmental Quality (WDEQ) permitted and authorized facilities (see p. 8 of Master Surface Use Plan (MSUP).
- During the drilling phase of each individual well (6 to 8 week period per well) the average daily traffic to and from the location is approximately 2 large trucks (water hauler, cement trucks, etc.) and 6 personal pickup trucks per day. During the well completion process (3 to 4 week period per well) the average daily traffic increases to 4 to 6 large trucks and 6 personal pickup trucks per day. During the production phase the average daily traffic will decrease to 1 to 2 pickup trucks per day.
- If the wells produce, produced water will be stored in tanks on the location and truck it off to a WDEQ approved Class I disposal well or evaporation facility. Specifics related to production and potential buried flow lines for produced water will be addressed by sundry action. Potential quantities of produced water are unknown at this time.
- The constructed well pads were designed to minimize cut and fill slopes. The project designed features as outlined in the MSUP, pad design drawings, and road deigns will rectify impacted areas by repairing, rehabilitating and/or restoring the affected environment. The operator's design features will reduce or eliminate impacts over time by preservation and maintenance operations during the project's life.

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

Drilling and Completion Step	Approximate Duration
Build location (roads, pad, and other initial infrastructure)	21 days
Mobilize rig	5 days
Drilling (24/7)	70 days
Schedule/logistics for completion	21 days
Completion (setup, completion, demobilization)	21 days

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

Additionally, the operator, in their APD, 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 in their submitted surface use and drilling plans.
- Certify it has a surface access agreement with the landowners.

Reasonably Foreseeable Activity:

The reasonably foreseeable activity (RFA) for this and adjacent areas includes oil/gas exploration on 1280 acre spacing and possible 640 acre spacing. (This does not preclude the spacing analysis in the PRB FEIS or applying to drill multiple wells from these 2 pads further reducing the surface disturbance per well). SM Energy's RFA consists of 64 wells on 16 well pads. The RFA area defined by SM Energy as their Deep Powder Development is located here;

T.42N., R.77W. Sec. 36

T.41N., R.77W. Sec. 1, 2, 11, 12 and T.41N., R.76W. Sec. 5-8, 14-23, 25-36

The project analysis area is defined as the area within 5 miles of the proposed Trigger and Target wells. Well development beyond the analysis area could be 1 well per 2 sections. Future development may use existing well pads and infrastructure put in place for fee and/or federal mineral development. Potential

APD submittals could also consist of multiple wells on an existing pad or tie into existing supporting infrastructure such as; tank batteries, pipelines, powerlines, and transportation networks.

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

This proposal does not diverge from the goals and objectives in the Buffalo Resource Management Plan (RMP), 1985, 2001, 2003, 2011, and generally conforms to the terms and conditions of that land use plan, its amendments, supporting FEISs, 1985, 2003 (2011), and laws including the Clean Air Act, 42 USC 7401-7671q (2006), the Clean Water Act, 33 USC 1251 et seq. (1972), etc.

3. AFFECTED ENVIRONMENT

This section briefly describes the physical and regulatory environment that may be significantly affected by the alternatives in Section 2, or where changes in circumstances or regulations occurred since adoption of analyses to which the EA tiers or incorporates by reference; see Table 3.1. 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. 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 currency in the no action alternative. 615 F. 3d 1122 (9th Cir. 2010). There are 58 producing oil and gas wells in the project area, Wyoming Oil and Gas Conservation Commission (WOGCC) 2013. 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. (See Table 2.1 and 2.2 for an approximation of the disturbance in the current situation.) This agrees with the PRB FEIS which analyzed the reasonably foreseeable development rolling across the PRB of 51,000 CBNG and 3,200 natural gas and oil wells. In addition other operators are likely to continue seeking permits to develop unconnected leases in or in the affects analysis areas near the project area; decisions to approve or deny future proposals will occur following APD submittal. Development occurring on non-federal surface and non-federal mineral estate would continue.

Table 3.1. Overlapping NEPA Analyses Which BLM Incorporates by Reference either as similar deep drilling analyses or as substantially similar surface analyses in the semi-arid sage-brush, short grass prairie.

#	POD / Project Name	NEPA Analysis	# Type Wells	Approved Mo/Yr/Update
1	Spruce 2 POD	WY-070-EA13-240	5 / Oil	7/30/13
2	Grayling POD	WY-070-10-332	80 / CBNG	3/1/11

See also: SDR WY-2013-005, particularly noting pp. 2-3, incorporating the entirety here by reference.

3.1. Air Quality

Refer to the PRB FEIS pp. 3-291 to 3-299, for a 2003-era description of the air quality conditions. BLM incorporates by reference, 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 Environmental Protection Agency (EPA) established ozone standards in 2008, finalizing them in 2011. Existing air quality in the PRB is “unclassified/attainment” with all ambient air quality standards. It is also in an area that is in prevention of significant deterioration zone. PRB air quality is a rising concern due to ozone in the oil and gas producing Upper Green River Basin that became 1 of the nation’s 40 “nonattainment” zones for ozone in 2012; in addition to PRB-area air quality alerts issued in 2011-2014 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 9 sites throughout the State, and particulate concentrations from 5 of those sites, monitors speciated aerosol (3 locations), and evapotranspiration rates (1 location). The sites monitoring air quality for the Powder River Basin are located at Sheridan, South Coal Reservoir, Buffalo, Fortification Creek, and Newcastle. The northeast Wyoming visibility study is ongoing by the Wyoming Department of Environmental Quality (WDEQ). Sites adjacent to the Wyoming PRB-area are at Birney on the Tongue River 24 miles north of the Wyoming-Montana border, Broadus on the Powder River in Montana, and Devils Tower.

Existing air pollutant emission sources in the region include:

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

3.2. Ecological Sites: Soils and Vegetation

Ecological site descriptions provide soils and vegetation data 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 loamy ecological site. Layers of the soil most influential to the plant community varies from 3 to 6 inches thick. These layers consist of the A horizon with very fine sandy loam, loam, or silt loam texture and may also include the upper few inches of the B horizon with sandy clay loam, silty clay loam or clay loam texture. Project area soils differ with topographic location, slope, and elevation. Erosion potential varies depending on the soil type, vegetative cover, and slope. Interpretations of soil modeling data show soils disturbed from construction of well pads, specifically cut and fill slopes, are highly susceptible to water and wind erosion. Reclamation potential of soils in the project area is fair. Refer to ecological site narrative section below for description of vegetation species observed during onsite field visits. Interpretations of soil modeling data show soils disturbed from construction of well pads, specifically cut and fill slopes, are highly susceptible to water and wind erosion. Reclamation potential of soils also varies in 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.

Loamy Sites: This site occurs on gently undulating to rolling land on landforms which include hill sides, alluvial fans, ridges and stream terraces, in the 10 to 14 inch precipitation zone. The soils of this site are moderately deep to deep (greater than 20 inches to bedrock), well drained soils that formed in alluvium and residuum derived from sandstone and shale. These soils have moderate permeability. Plant communities consisted of:

<u>Rhizomatous Wheatgrasses, Needle and thread, Blue Grama Plant Community</u>

This plant community is the interpretive plant community for this site and is considered to be the Historic Climax Plant Community (HCPC). This plant community evolved with grazing by large herbivores and is well suited for grazing by domestic livestock. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of rest. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. This state is dominated by cool season mid-grasses. The major grasses include western wheatgrass, needleandthread, and green needlegrass. Other grasses occurring in this state include

Cusick's and Sandberg's bluegrass, bluebunch wheatgrass, and blue grama. A variety of forbs and half-shrubs also occur. Big sagebrush is a conspicuous element of this state, occurs in a mosaic pattern, and makes up 5 to 10% of the annual production. Plant diversity is high. This plant community is extremely stable and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity).

Mixed Sagebrush/Grass Plant Community

Historically, this plant community evolved under grazing by bison and a low fire frequency. Currently, it is found under moderate, season-long grazing by livestock in the absence of fire or brush management. Wyoming big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grasses, and miscellaneous forbs. Dominant grasses include needleandthread, western wheatgrass, and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, and Sandberg bluegrass. Forbs commonly found in this plant community include plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear can also occur. When compared to the Historic Climax Plant Community, sagebrush and blue grama have increased. Production of cool-season grasses, particularly green needlegrass, has been reduced. The sagebrush canopy protects the cool-season mid-grasses, but this protection makes them unavailable for grazing. Cheatgrass (downy brome) has invaded the site. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as mule deer and antelope. This plant community is resistant to change. A significant reduction of big sagebrush can only be accomplished through fire or brush management. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

Western Wheatgrass/Cheatgrass Plant Community

This plant community is created when the Mixed Sagebrush/Grass Plant Community or the Heavy Sagebrush Plant Community is subjected to fire or brush management not followed by prescribed grazing. Rhizomatous wheatgrasses and annuals will eventually dominate the site. Compared to the HCPC, cheatgrass has invaded with western wheatgrass and thickspike wheatgrass maintaining at a similar or slightly higher level. Virtually all other cool-season mid-grasses are severely decreased. Blue grama is the same or slightly less than found in the HCPC. Plant diversity is low. This plant community is relatively stable with the rhizomatous wheatgrasses being somewhat resistant to overgrazing and the cheatgrass effectively competing against the establishment of perennial cool-season grasses. An increase in bare ground reduces water infiltration and increases soil erosion. The watershed is usually functioning. The biotic integrity is reduced by the lack of diversity in the plant community.

3.3. Water Resources

WDEQ regulates Wyoming's water quality with EPA oversight. 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. The WOGCC has authority for permitting and bonding off channel pits located over state and fee minerals.

3.3.1. Groundwater

The areas historical use of groundwater was for stock or domestic water. A search of the WSEO Ground Water Rights Database showed 8 registered stock and 0 domestic water wells within 1 mile of the proposed wells with depths from 30 to 350 feet. See also, the PRB FEIS, pp. 3-1 to 3-36. The 2004 EPA study found it unlikely that hydraulically fractured CBNG wells would contaminate ground water. The EPA has an expansive, on-going study looking at more aspects of hydraulic fracturing and has yet to issue

findings. A 2011-2012 Geological Survey study found no groundwater effects from thousands of deep horizontally fractured oil and gas wells. Another study found no direct link between hydraulic fracturing and studied aquifers, Warner, 2012. Here, the Fox Hills, the deepest penetrated fresh water zone in the PRB lies well above the target formation. Depth to the Fox Hills formation is 6,024 feet and 6,085 feet total vertical distance (TVD) respectively. Adgate, 2014, Warner 2012, and news sources reveal a minor controversy over a state's non-disclosure of proprietary HF fluids while release decisions receive administrative and court reviews.

3.3.2. Surface Water

The project area lies in tributaries to the Upper Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt). Some of the drainages, Artesian Draw in particular, could be characterized as intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels range from steep gullies to gentle, well vegetated grassy swales, without defined beds and banks. See the PRB FEIS for surface water quality, pp. 3-48 to 3-49, and for surface water, pp. 3-36 to 3-56. No further analysis of surface water will be discussed.

3.4. Wetlands/Riparian

There are no wetlands or riparian areas near the proposed well pads or infrastructure so the project should not impact wetlands or riparian areas.

3.5. Invasive or Noxious Species

The following state-listed noxious weed and/or weed specie of concern infestations were discovered by a search of inventory databases on the Wyoming Energy Resource Information Clearinghouse (WERIC) web site (www.weric.info): Leafy Spurge (Euphorbia esulaL.) The WERIC database was created cooperatively by the University of Wyoming, BLM and county weed and pest offices. Additionally, the operator inspected the project area for noxious weeds, and confirmed isolated patches within the project area. The following is a list of State and County Designated Noxious Weeds that were encountered within the project area: Canada thistle (*Cirsium arvense L.*), spotted knapweed (*Centaurea maculosa Lam.*), and Russian knapweed (*Centarurea repens.*). In addition, Campbell County Weed and Pest declared the following 5 species as weeds of concern in the project area: black henbane (*Hyoscyarnus niger L.*), buffalobur (*Solanum rostratum Dun.*), common cocklebur (*Xanthium strumarium L.*), salt cedar (*Tamarix ramosissima Ledeb.*), and leafy spurge (*Euphorbia esula L.*). Cheatgrass is prevalent throughout the project area. The state-listed noxious weeds are in PRB FEIS, Table 3-21, p. 3-104; and the Weed Species of Concern are in Table 3-22, p. 3-105.

3.6. Fish and Wildlife

3.6.1. Wildlife

The PRB FEIS identified wildlife species occurring in the PRB, pp. 3-113 to 3-206. The biologist evaluated impacts to wildlife resources and recommended project modifications where wildlife issues arose. BLM also consulted databases compiled and managed by BLM BFO wildlife staff, the PRB FEIS, WGFD datasets, and the Wyoming Natural Diversity Database (WYNDD) to evaluate the affected environment for wildlife species that may occur in the project area. The project area encompasses 31 square miles; the location is described in the Reasonably Foreseeable Activity section (pp 4.) Rationale for any species not discussed below is found in Appendix A.

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

The Buffalo BLM receives a species list periodically from the US Fish and Wildlife Service (FWS) of threatened, endangered, proposed, and candidate species. Species included on that list that may be impacted by the proposed project will be discussed below.

3.6.2.1. Ute Ladies'-Tresses Orchid (ULT)

The FWS lists the Ute ladies'-tresses orchid (ULT) as threatened. The PRB FEIS discussed the affected environment for ULT, p. 3-175. Repeated surveys conducted for coalbed natural gas projects in the PRB have not identified the plant in suitable habitat. The project disturbance will occur in upland habitats not suitable for ULTs.

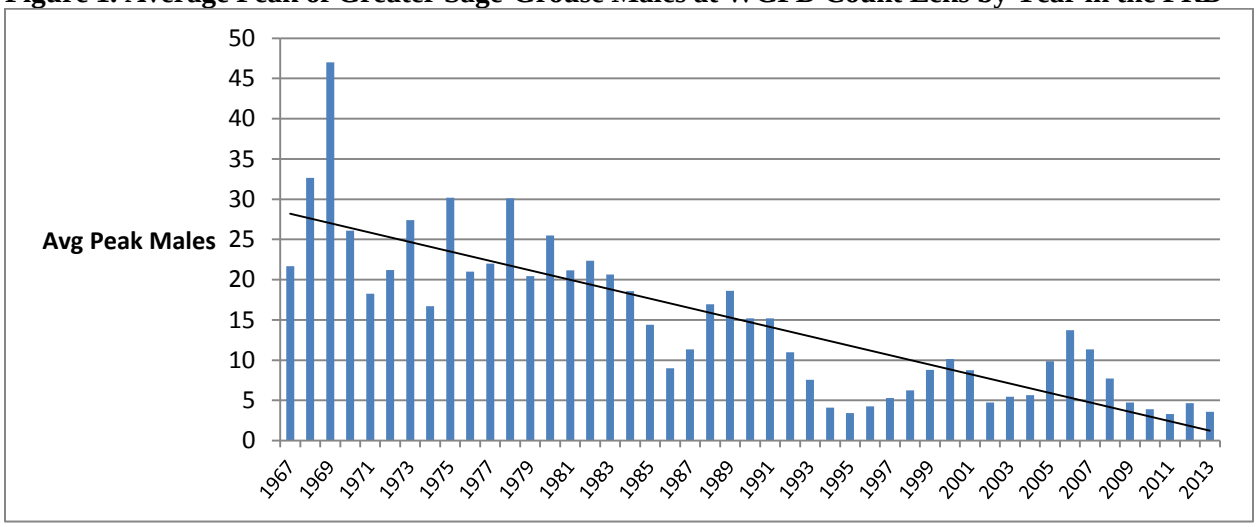
3.6.2.2. Northern Long-Eared Bat

The FWS proposed the Northern long-eared bat (*Myotis septentrionalis*) for listing under the ESA, October 2, 2013; 78 FR 61046. The bat is threatened by white-nose syndrome (WNS), a disease caused by the cold-loving fungus, *Psuedogymnoascus* (*Geomyces*) *destructans*. Throughout the range of WNS, up to 99% of infected bats die from the disease. Yet, other threats (the present or threatened destruction, modification, or curtailment of its habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; other natural or manmade factors affecting its existence) when combined with WNS heighten the risk to the species (FWS 2013b). The species occurs in northeastern Wyoming and is documented in Campbell, Crook, and Weston Counties; however, population information is limited, and the species is considered uncommon or rare outside of the Black Hills (FWS 2013b). Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch in flight using echolocation, or by gleaning (picking) from vegetation. In the summer, male and reproductive female bats roost singly or in colonies in cracks, crevices, cavities, and under the bark of live and dead trees, while other males and non-reproductive females roost in cooler places like caves and mines (FWS 2013A, Adams 2003). Suitable habitat is not present, and the project area is outside the bat's known range.

3.6.2.3. Greater Sage-Grouse (GSG)

PRB FEIS has a detailed discussion on GSG ecology and habitat, pp. 3-194 to 3-199. Subsequently the FWS determined the Greater Sage-Grouse (GSG) warrants federal listing as threatened across its range, but precluded listing due to other higher priority listing actions, 75 Fed. Reg. 13910 to 14014, Mar. 23, 2010; 75 Fed. Reg. 69222 to 69294, Nov. 10, 2010. GSG are a WY BLM special status (sensitive) species (SSS) and a WGFD species of greatest conservation need because of population decline and ongoing habitat loss. The 2012 population viability analysis for the Northeast Wyoming GSG found there remains a viable population of GSG in the PRB (Taylor et al. 2012). However, threats from energy development and West Nile virus (WNv) 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.

Figure 1. Average Peak of Greater Sage-Grouse Males at WGFD Count Leks by Year in the PRB



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

The State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (2008) notes that impacts to leks occur within 4 miles of oil and gas developments. WGFD records indicate that 4 occupied GSG leks (Bushwacker III, Cedar Canyon, Collins SW, and Mai Tai) occur within 4 miles of the project area, an area of 189 square miles. The project area is not in a core or connectivity habitat area, as identified in EO 2011-5, Greater Sage-grouse Core Area Protection. GSG habitat models indicate that approximately 20% of the project area contains high quality GSG nesting habitat and approximately 15% winter habitat (Walker et al. 2007) but actual observation at the onsite (well locations and associated access) to be mostly grassland with a few patches of sage. No leks are within 4 miles of the proposed Trigger and Target wells. GSG sign (winter scat) was found during the field inspection near the Trigger well's access road.

3.6.3. Special Status (Sensitive) Species (SSS)

The PRB FEIS discussed the affected environment for SSS, p. 3-174 to 201. The administrative record (AR) lists those SSS that may occur in the project area. It also includes a brief description of the habitat requirements for each species. BLM discusses those SSS impacted beyond the level analyzed in the PRB FEIS, below.

3.6.4. Big Game

The big game species occurring in the project area are mule deer and pronghorn. The project is in yearlong mule deer range and winter/yearlong pronghorn range. The PRB FEIS discussed the affected environment for pronghorn and mule deer on pp. 3-117 to 3-122 and pp. 3-127 to 3-132 respectively.

3.6.4.1. Raptors

The PRB FEIS discussed the affected environment for raptors, pp. 3-141 to 3-148. The BLM raptor database shows that 19 raptor nests are within 0.5 miles of the project area. Red-tailed hawks are the most numerous. Other species nesting in the project area include Swainson's hawk, ferruginous hawk, and great-horned owl. Three unknown raptor nests (BLM #'s 6281, 13509 and 13510) are within 0.5 mile of the proposed Trigger Fed 4176-16-21-1FH well. Historically, nest # 6281 was used by red-tailed hawks.

3.6.4.2. Migratory Birds

The PRB FEIS discussed the affected environment for migratory birds, pp. 3-150 to 3-153. A wide variety of migratory birds may occur in the proposal area during the year. Migratory birds migrate for breeding and foraging at some point in the year. The BLM-FWS Memorandum of Understanding (MOU) (2010) promotes the conservation of migratory birds, complying with Executive Order 13186 (Federal Register V. 66, No. 11). BLM encourages voluntary design features and conservation measures supporting migratory bird conservation, in addition to appropriate restrictions. Habitats occurring near the proposed well location and throughout the project area include sage-brush steppe grasslands, mixed grass prairie. 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 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 3.3.

Table 3.3. Migratory Birds Occurring in Shrub-steppe Habitat, NE Wyoming (Nicholoff 2003)

Level	Species	WY BLM SSS?	Species	WY BLM SSS?
Level I	Brewer's sparrow	Yes	Mountain Plover	Yes
	Ferruginous hawk	Yes	Sage sparrow	Yes
	McCown's longspur	No		
Level II	Grasshopper Sparrow	No	Loggerhead shrike	Yes
	Lark bunting	No	Sage thrasher	Yes
	Lark sparrow	No	Vesper sparrow	No
Level III	Common poorwill	No	Say's phoebe	No

3.7. Cultural Resources

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 National Register of Historic Places (NRHP)). For an overview of cultural resources found in BFO area, refer to the Draft Cultural Class I Regional Overview, Buffalo Field Office (BLM, 2010). Class III (intensive) cultural resource inventories (BFO project no. 700130118, 70140056) were performed to locate specific historic properties which may be impacted by the proposed project. No cultural resources are located in the proposal area.

4. ENVIRONMENTAL EFFECTS

No Action Alternative. BLM analyzed the no action alternative as Alternative 3 in the PRB FEIS and it subsequently received augmentation of the effects analysis in this EA through the analysis of mineral 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 updated the no action alternative and cumulative effects. The project area has surface disturbance from existing roads, well pads, and oil and gas facilities. Under the no action alternative, on-going well field operations would continue as would the development of approved single and multi-well pads, consisting of horizontal wells with approved APDs and other approved APDs. The production and the drilling and completion of these new wells would result in noise and human presence that could affect 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 traffic on unpaved roads. 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, Proposed Action (Proposal)

4.1. Air Quality

In the project area, air quality impacts would occur during construction (due to surface disturbance by 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. BLM incorporates by reference the analysis found in the August 2012 Lease Sale EA, WY-070-EA12-44, pp. 45-51 (air quality, greenhouse gas emissions, and visibility). Air quality impacts modeled in the PRB FEIS and Cumulative Air Quality Effects, 2009 concluded that PRB projected fluid and solid development would not violate state, tribal, or federal air quality standards and this project is well within the projected development parameters.

4.2. Ecological Sites, Soils, and Vegetation

4.2.1. Direct and Indirect Effects

The effects to soils and vegetation resulting from well pad, road, and pipeline construction include:

- Mixing of horizons – occurs where construction on roads, or other activities take place. Mixing may result in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts, or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
- Loss of soil vegetation cover, biologic crusts, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Soil erosion would also affect soil health and productivity. Erosion rates are site specific and are dependent on soil, climate, topography, and cover.
- Soil compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.
- Modification of hill slope hydrology.
- Direct effects (removal and/or compaction) to vegetation would occur from ground disturbance caused by drilling rig equipment and construction of a well pads, tank batteries, 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, water-handling facilities or other semi-permanent facilities may result in loss of vegetation and affect reclamation success for the life of the project.
- Soils will be subjected to wind and water erosion.

The BLM will evaluate reclamation success using the requirements in the BLM State Wide Reclamation Policy found at: http://www.blm.gov/wy/st/en/programs/reclamation, incorporated here by reference.

4.2.2. Cumulative Effects

For details on expected cumulative impacts, refer to the PRB FEIS, pp. 4-151. The PRB FEIS defines the designation of the duration of disturbance (pp. 4-1 and 4-151). Most soil disturbances would be short term impacts with expedient interim reclamation and site stabilization. These impacts, singly or in combination, could increase the potential for valuable soil loss due to increased water and wind erosion, invasive/noxious/poisonous plant spread, invasion and establishment, and increased sedimentation and salt loads to the watershed system, if applicable mitigation measures are not used.

4.2.3. Mitigation Measures

The proponent planned their project to maximize the fluid mineral drainage while avoiding areas with soil limitation where possible. The proponent also designed the infrastructure such that no engineering roads will be required and uses existing oil/gas roads as much as possible to access the proposed well locations. The proponents operated committed measures and design features preclude application of site specific conditions of approval (COAs).

4.2.4. Residual Effects

Residual effects across the POD would include a long-term loss of soil productivity associated with well pad 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. Due to the presence of erosive soils and the topography of the project area erosion will occur. Rilling and gullying of cut and fill slopes on, access/utility corridors, will take place. Impacts from livestock to stabilized cut and fill slopes will limit soils becoming stable and getting vegetation establish. The PRB FEIS defined the designation of the duration of disturbance, pp. 4-1 and 4-15. "For this EIS, short-term effects are defined as occurring during the construction and drilling/completion phases. Long-term effects are caused by construction and operations that would remain longer".

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Construction of new access roads was reduced by placing the wells where existing oil/gas access roads are used when possible. This results in less surface disturbance and environmental impacts. See Section 2.2 for a summary of the disturbance. All disturbances associated with the proposal are long term. With the reclamation status of the project area being rated as fair and field observations showing areas of reclamation success expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, etc.) would ensure land productivity/stability is regained and maximized. The BLM considers these residual effects from Alternative B with the proposed wells are likely within the parameters for acceptable surface disturbance and surface disturbance reclamation in PRB FEIS ROD and Onshore Oil and Gas Order Number 1.

4.3. 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 minimize an adverse impact on ground water. The volume of water produced by this federal mineral development is unknowable at the time of permitting. "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. Supp. 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.

4.3.1. Groundwater

4.3.1.1. Direct and Indirect Effects

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, see, http://www.spe.org/jpt/print/archives/2010/12/10Hydraulic.pdf. Lastly, the EPA 2004 study and its on-going, detailed study of hydraulic fracturing yielded, thus far, no immediate cautions, concerns, or warnings that present industry and regulatory practices endanger ground water or require immediate changes.

At the time of permitting, the volume of water that will be produced in association with these federal minerals is unknown. The operator will have to produce the wells for a time to be able to estimate the water production. In order to comply with the requirements of Onshore Oil and Gas Order #7, Disposal of Produced Water, the operator will submit a Sundry to the BLM within 90 days of first production which includes a representative water analysis as well as the proposal for water management. Historically, the quality of water produced in association with conventional oil and gas has been such that surface discharge would not be possible without treatment. Initial water production is quite low in most cases. There are three 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.

4.3.1.2. Cumulative Effects

BLM foresees minimal cumulative effects either to or from the use of ground water for these 2 proposed wells. BLM anticipates no need for mitigation measures beyond the design features and programmatic COAs. BLM anticipates no residual effects to ground water from this project.

4.3.1.3. Mitigation Measures

Adherence to the drilling COAs, the setting of casings at appropriate depths, following safe remedial procedures, and using proper cementing procedures should protect possible fresh water aquifers. The target formation is the Frontier Formation with total vertical depths approximately 12,400 feet. Specific to protection of the Fox Hills Formation as described in the drilling plan the operator will run surface casing to 3600 feet, total vertical depth and cement to surface to protect potential shallow aquifers. This will ensure that ground water will not be adversely impacted by well drilling and completion operations. The Fox Hills Formation occurs at a depth between 7585 feet and 7752 feet. A gamma ray log will be run from TVD to surface. The gamma ray log will be run either with a wire line or LWD (logging while drilling) tools. The gamma ray log will indicate the top and bottom of Fox Hills Formation. Also as described in Appendix 1 of the drilling plans the operator will utilize one of the following techniques to properly identify that the cement top is above the Fox Hills Formation: a) radioactive cement tracer and associated tools, b) cement bond log, or C) temperature survey. This will help ensure that ground water of the Fox Hills Formation will not be adversely impacted by well drilling and completion operations.

4.4. Invasive Species

4.4.1. Direct and Indirect Effects

The operator committed to the control of noxious weeds and species of concern using the following measures identified in their integrated pest management plan (IPMP): 1) control methods, including mowing and herbicide. The use of existing facilities along with the surface disturbance associated with construction of proposed access roads, pipelines, and related facilities would present opportunities for weed invasion and spread. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as Canada thistle. However, applicant committed measures will reduce potential impacts from noxious weeds and invasive plants.

4.4.2. Cumulative Effects

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

4.4.3. Mitigation Measures

SM Energy's committed measures in the MSUP to identify, reduce opportunities to spread, and treat infestation of noxious weeds and invasive plants, listed in the MSUP, will reduce potential impacts from

these species. Refer to the Weed Control Program in the MSUP for a complete listing of general and species-specific applicant committed measures to address this issue.

4.4.4. Residual Effects

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

4.5. Fish and Wildlife

4.5.1. Wildlife Threatened, Endangered, Proposed and Candidate Species

4.5.1.1. Ute Ladies'-Tresses Orchid

Limited potential habitat is present in the project area. Implementation of the proposed project will have "*no effect*" on ULT. The PRB FEIS discussed the cumulative effects to ULT (p. 4-253 to 4-254). No mitigation is proposed with alternative B. No residual effects are anticipated.

4.5.1.2. Northern Long-eared Bat

4.5.1.2.1. Direct and Indirect Effects

Suitable roosting habitat for Northern long-eared bat is not present in the project area. Implementation of the proposed project will have "*no effect*" on the species.

4.5.1.2.2. Cumulative Effects

The Northern long-eared bat is not discussed in the PRB FEIS; however, the PRB FEIS discussed the cumulative effects to special status species (p. 4-272 to 4-273). Although there is uncertainty about the spread of White Nose Syndrome, experts agree that the fungus will likely spread throughout the US. The northern long-eared bat is also threatened by the loss and degradation of summer habitat caused by human development, and by collision with or barotrauma (injury to the lungs due to a change in air pressure) caused by wind turbines. Mine closures, vandalism of roosts, and hibernacula also threaten to this species (FWS 2013b).

4.5.1.2.3. Mitigation Measures

The BLM recommends that measures are taken to ensure that all bats are excluded from 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 toxic substances are present.

4.5.1.2.4. Residual Effects

No residual impacts are anticipated.

4.5.1.3. Greater Sage-Grouse (GSG)

4.5.1.3.1. Direct and Indirect Effects

The PRB FEIS discusses impacts to GSG on pp. 4-257 to 4-273. Implementation of this proposal will impact GSG habitat and individuals. Because of the limited amount of GSG habitat in the project area, impacts from this project to GSG will be minimal. Impacts to GSG are generally a result of loss and fragmentation of sagebrush habitats associated with roads and infrastructure. Research indicates that GSG hens also avoid nesting in developed areas. Impacts to GSG associated with energy development are discussed in detail in the 12-Month Findings for Petitions to List the Greater Sage-Grouse (Centrocercus urophasianus) as Threatened or Endangered (FWS 2010) and chapters 15-21 of Greater Sage-grouse Ecology and Conservation of a Landscape Species and its Habitats (Knick and Connelly 2011).

The proposal area has some suitable GSG habitat. Construction of the well and associated infrastructure will cause a slight amount of fragmentation of sagebrush stands in approximately 65 acres disturbed by the project. Noise and human disturbance associated with roads, construction, drilling, and completion will be disruptive to any GSG that might use the area.

It is the policy of BLM WY to manage GSG habitats consistent with the provisions set forth by the State of Wyoming, and as described in Instruction Memorandum (IM) No. WY-2012-019, *Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands Including the Federal Mineral Estate*. IM 2012-019 states that for areas outside of core and connectivity habitats, "Surface disturbing and/or disruptive activities are prohibited from March 15–June 30 to protect sage-grouse nesting and early brood rearing habitats within 2 miles of the lek or lek perimeter of any occupied lek located outside core or connectivity areas." There are no known leks within 2 miles of the proposed Trigger Fed 4176-16-21-1FH and Target Fed 4176-17-20-1FH wells.

4.5.1.3.2. Cumulative Effects

The PRB FEIS (BLM 2003) states that "the synergistic effect of several impacts would likely result in a downward trend for the sage-grouse population, and may contribute to the array of cumulative effects that may lead to its federal listing. Local populations may be extirpated in areas of concentrated development, but viability across the Project Area [PRB] or the entire range of the species is not likely to be compromised (p. 4-270)." Based on the impacts described in the PRB FEIS and the findings of recent research, this proposal may contribute to a decline in male attendance at leks that occur within 4 miles of the project. There are no occupied leks within 4 miles of the Trigger Fed 4176-16-21-1FH and Target Fed 4176-17-20-1FH wells so the action should not contribute to the decline of any leks, but the proposal's RFA may. Declines in lek attendance associated with oil and gas development are result of a suite of factors including avoidance (Holloran et al. 2005, Holloran et al. 2007, Aldridge and Boyce 2007, Walker et al. 2007, Doherty et al. 2008, WGFD 2009), loss and fragmentation of habitat (Connelly et al. 2000, Braun et al. 2002, Connelly et al. 2004, WGFD 2004, Rowland et al. 2005, WGFD 2005, Naugle et al. 2011), reductions in habitat quality (Braun et al. 2002, WGFD 2003, Connelly et al. 2004, Holloran et al. 2005) and changes in disease mechanisms (Naugle et al. 2004, WGFD 2004, Walker et al. 2007).

The Buffalo Resource Management Plan (BLM 2001) and the PRB FEIS Record of Decision (BLM 2003) included a 2-mile timing limitation on surface-disturbing activities around GSG leks. The 2-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA) (BLM 2004). Wyoming BLM adopted the two-mile recommendation in 1990 (BLM 1990). The 2-mile recommendation was based on early research which indicated between 59% and 87% of GSG nests were located within 2 miles of a lek (BLM 2004). These studies were conducted in vast contiguous stands of sagebrush, such as those that occur in Idaho's Snake River plain.

Newer research across more of the GSG's range has since indicated that nesting may occur much farther than 2 miles from the breeding lek (BLM 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported that only 45% of their GSG hens nested within 1.9 miles of the capture lek. Moynahan and Lindberg (2004) found that only 36% of their GSG hens nested within 1.9 miles of the capture lek. Habitat conditions, and, thus, GSG biology, in the PRB area are more similar to Moynahan's north-central Montana study area than the Upper Green River area. Moynahan's study area occurred in mixed-grass prairie and sagebrush steppe, dominated by Wyoming big sagebrush (Moynahan et al. 2007). Recent research in the PRB suggests that impacts to leks from energy development are discernible out to a minimum of 4 miles, and that some leks in this radius have been extirpated as a direct result of energy development (Walker et al. 2007, Walker 2008, Naugle et al. 2011). BLM determined, based on these studies, that a 2-mile timing limitation is insufficient to reverse the population decline.

The 2012 population viability analysis for the NE Wyoming GSG found there remains a viable population of GSG in the PRB (Taylor et al. 2012). Threats from energy development and West Nile Virus (WNv) are impacting future viability (Taylor et al. 2012). The study indicated that effects from energy development, as measured by male lek attendance, are discernible out to a distance of 12.4 miles. Studies document the additive impacts of energy development and WNv as a threat to GSG persistence in the PRB (Taylor et al. 2012, Garton et al. 2011). The cumulative and synergistic effects of CBNG development and WNv in the PRB area will continue to impact the local GSG population, causing further declines in lek attendance, and could result in local extirpation: "[f]indings reflect the status of a small remaining sage-grouse population that has already experienced an 82% decline within the expansive energy fields." (Taylor et al. 2012).

Current well densities reduce the effectiveness of PRB core areas (Taylor et al. 2012). Continued energy development around the core areas will reduce PRB core areas remaining value. WNv outbreaks combined with energy development reduce sage-grouse populations and interact to exacerbate population declines. The effects of one WNv outbreak year could cut a population in half. Absent a WNv outbreak, or another stochastic event of similar magnitude, immediate extirpation is unlikely. Results suggest that if current oil and gas development rates continue, they may compromise future viability of NE Wyoming GSG, with an increased chance of extirpation with additional WNv outbreaks (Taylor et al. 2012).

4.5.1.3.3. Mitigation Measures

Because of the limited amount of habitat in the project area and distance from any know GSG leks, BLM is not recommending any mitigation for GSG in this project.

4.5.1.3.4. Residual Effects

BLM anticipates no residual impacts.

4.5.2. Special Status (Sensitive) Species (SSS)

The PRB FEIS discusses impacts to SSS on pp. 4-257 to 4-265. The effects to sensitive species resulting from implementation of the project are in Appendix A.

4.5.2.1. Big Game

4.5.2.1.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, cumulative effects, and residual effects to big game on pp. 4-181 to 4-215. Pronghorns and mule deer would be directly disturbed with the construction of the well, and associated infrastructure. Long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established. In addition to the direct habitat loss, big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 miles (Hiatt and Baker 1981). The WGFD indicates a well density of 8 wells per section creates a high level of impact for big game and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). A multi-year study on the Pinedale Anticline suggests not only do mule deer avoid mineral activities, but after 3 years of drilling activity the deer have not become accustomed to the disturbance (Madson 2005, Sawyer et al. 2006).

Big game animals are expected to return to the project area following construction; however, populations would likely be lower than prior to project implementation as the human activities associated with operation and maintenance continue to displace big game. Mule deer are more sensitive to operation and maintenance activities than pronghorn, and, as the Pinedale Anticline study suggests, mule deer do not readily habituate. A study in North Dakota stated, "although the population (mule deer) had over 7 years to habituate to oil and gas activities, avoidance of roads and facilities was determined to be long term and

chronic" (Lustig 2003). Mule deer have been shown to avoid all types of well pads but tended to select areas farther from well pads associated with higher levels of traffic (Sawyer et al. 2009). Deer have even been documented to avoid dirt roads that were used only by 4-wheel drive vehicles, trail bikes, and hikers (Jalkotzy et al. 1997).

Winter big game diets are sub-maintenance, meaning they lose weight and body condition as the winter progresses. Survival below the maintenance level requires behavior that emphasizes energy conservation. Canfield et al. (1999) pointed out that forced activity caused by human disturbance exacts an energetic disadvantage, while inactivity provides an energetic advantage for animals. Geist (1978) further defined effects of human disturbance in terms of increased metabolism, which could result in illness, decreased reproduction, and even death. Energy development activities that occur in big game habitats during the spring will likely displace adult females and juveniles due to the human presence in the area. This may cause reduced survival rate of individuals that must expend increased energies to avoid such activities.

4.5.2.1.2. Cumulative Effects

The cumulative effects associated with Alternative B are within the analysis parameters and impacts described in the PRB FEIS; p. 4-181 to 4-215.

4.5.2.1.3. Mitigation Measures

No mitigation is proposed with Alternative B.

4.5.2.1.4. Residual Effects

No residual impacts are anticipated.

4.5.2.2. Migratory Birds

4.5.2.2.1. Direct and Indirect Effects

The PRB FEIS discussed direct and indirect effects to migratory birds on pp. 4-231 to 4-235. The PRB FEIS states on p. 4-231, "Surface disturbance associated with construction, operation, and abandonment of facilities, including roads, has the potential to result in direct mortality of migratory birds. Most birds would be able to avoid construction equipment; however, nests in locations subject to disturbance would be lost, as would any eggs or nestlings." Direct mortality of a bird or destruction of an active nest due to construction activities 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 (4.6.2.1.1).

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

During the onsites, the BLM biologist did not identify suitable nesting habitat present for any BLM sensitive sagebrush obligates. Construction of the well pad and associated infrastructure is not expected to impact BLM sensitive migratory birds. Heater treaters, and similar facilities with vertical open-topped stacks or pipes, can attract birds. Facilities without exclusionary devices pose a mortality risk. Once birds crawl into the stack, escape is difficult and the bird may become trapped (U.S. v. Apollo Energies Inc., 611 F.3d 679 (10th Cir. 2010); see also Colorado Oil and Gas Commission, Migratory Bird Policy, accessed February 13, 2012). To minimize these effects, BLM Recommends that the operator 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.

4.5.2.2.2. Cumulative Effects

The cumulative effects associated with alternative B are within the analysis parameters and impacts described in the PRB FEIS; p. 4-235.

4.5.2.2.3. Mitigation Measures

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. The BLM 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 toxic substances are present.

4.5.2.2.4. Residual Effects

Suitability of the project area for migratory birds will be negatively affected due to habitat loss and fragmentation and proximity of human activities associated with oil and gas development.

4.5.2.3. Raptors

4.5.2.3.1. Direct and Indirect Effects

The PRB FEIS discussed direct and indirect effects to raptors (pp. 4-216 to 4-22).Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to overheating or chilling of eggs or chicks. Prolonged disturbance can also lead to the abandonment of the nest by the adults. Both actions can result in egg or chick mortality. BLM recommends the location of all infrastructures requiring human visitation be designed to provide an adequate biologic buffer for nesting raptors. The operator has configured the tank battery on the south side of the proposed Trigger Federal 4176-16-21-1FH well pad. The tank battery will provide a barrier between the view shed of nest # 13509 and the pump jack and humans working at the well. A biologic buffer is a combination of distance and visual screening that provides nesting raptors with security such that routine activities preclude flushing the raptors.

Approximately 30 acres of foraging habitat will be removed with the construction of the well pad and related infrastructure as depicted in Table 2.1.

4.5.2.3.2. 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. 4-221.

4.5.2.3.3. Mitigation Measures

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a 0.5 mile radius timing limitation during the breeding season around active raptor nests. The operator has committed to this timing limitation (see Design Features in project file).

4.5.2.3.4. Residual Impacts

There will be no residual impacts to raptors.

4.6. Cultural Resources

4.6.1. Direct and Indirect Effects

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. No historic properties will be impacted by the proposal. 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 18, 2014 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 described in Appendix L of the PRB FEIS and ROD must be followed. Further discovery procedures are in Standard COA (General)(A)(1).

4.6.2. Cumulative Effects

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

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

4.6.3. Mitigation Measures

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

4.6.4. 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.

BLM used the aggregate effects method in updating the cumulative effects for this EA; see Table 3.1. Any and all foreseeable effects from not following the recommended mitigation measures will not rise to significance, though such omission(s) may cause a minor increase in erosion, runoff, or other impacts.

5. CONSULTATION/COORDINATION:

BLM Consulted or Coordinated with the Following on this Analysis; OSP (Onsite Presence):

Contact	Organization	OSP?	Contact	Organization	OSP?
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