

**DECISION RECORD  
FOR  
EOG Resources, Inc.  
Project 785  
ENVIRONMENTAL ASSESSMENT –WY-070-EA10-238**

**DECISION:**

BLM’s decision is to approve EOG Resource INC. Project 785 oil wells Application for Permit to Drill (APD) Alternative B of the attached Environmental Assessment (EA). Alternative B is the Modified Proposed Action, and is the result of collaboration between the Bureau of Land Management and EOG Resource INC. Alternative B has been analyzed in the attached EA and found to have no significant impacts on the human environment, beyond those described in the Powder River Basin Final Environmental Impact Statement (PRB FEIS) thus an EIS is not required.

Details of the approval are summarized below. The project description, including specific changes made at the onsites is included in the attached EA, pp. 3-10.

**Well Sites:**

The following 7 Applications for Permit to Drill (APDs) and associated infrastructure are authorized:

	<b>Well Name</b>	<b>Well #</b>	<b>Well Pad Name</b>	<b>Qtr/Qtr</b>	<b>Section</b>	<b>TWP</b>	<b>RNG</b>	<b>Lease #</b>
1	Arbalest	01-02H	Arbalest 01-02H	SESE	2	41N	72W	WYW-143518
2	Crossbow	07-06H	Crossbow 07-06H	SESE	6	41N	71W	WYW-106828
3	Crossbow	10-06H	Crossbow 07-06H	SESE	6	41N	71W	WYW-108556
4	Crossbow	13-07H	Crossbow 13-07H	SESE	7	41N	71W	WYW-147267
5	Crossbow	16-07H	Crossbow 13-07H	SESE	7	41N	71W	WYW-106828
6	Crossbow	20-06H	Crossbow 20-06H	NENE	6	41N	71W	WYW-142772
7	Crossbow	23-06H	Crossbow 20-06H	NENE	6	41N	71W	WYW-108556

**Deferrals:**

The following 2 APDs and associated infrastructure are deferred until the identified deficiencies are satisfactorily addressed:

	<b>Well Name</b>	<b>Well #</b>	<b>Environmental Issue/Deficiency</b>	<b>Remedy</b>
1	Arbalest	09-23H	A surface use agreement has not been reached.	Submit a certification stating that a surface use agreement is in place for oil and gas operations or obtain a 3814 bond submitted as a liability for loss of crops and damage to tangible improvements in the interest of the private surface owner.
2	Bolt	01-35H	A surface use agreement has not been reached.	Submit a certification stating that a surface use agreement is in place for oil and gas operations or obtain a 3814 bond submitted as a liability for loss of crops and damage to tangible improvements in the interest of the private surface owner.

**Operator Committed Measures:**

The operator has incorporated several measures to alleviate resource impacts into their Master Surface Use Plan (MSUP), submitted on 5/18/2010. Refer to the MSUP pages 1-11, for complete details of operator committed measures.

**Site-Specific Mitigation Measures:**

Site-specific Conditions of Approval have been applied to this project, in addition to the programmatic and standard COAs identified in the PRB FEIS, to mitigate the site-specific impacts described in the Environmental Consequences section of the attached EA. For a complete description of all site-specific COA's associated with this approval, see section 2.2.2-2.2.3.4. in the attached EA.

**COMPLIANCE WITH LAWS, REGULATIONS, LAND USE PLANS, AND POLICIES:**

This approval is in compliance with all Federal laws, regulations, and policies. This includes, but is not limited to, the Federal Land Policy and Management Act, the National Historic Preservation Act, the Threatened and Endangered Species Act, the Migratory Bird Treaty Act, the Clean Water Act, the Clean Air Act, and the National Environmental Policy Act.

Approval of this alternative is in conformance with the *Powder River Basin Oil and Gas Project Environmental Impact Statement and Proposed Plan Amendment (PRB FEIS)*, *Record of Decision and Resource Management Plan Amendments for the Powder River Basin Oil and Gas Project (PRB FEIS ROD)*, and the Approved Resource Management Plan (RMP) for the Public Lands Administered by the Bureau of Land Management, Buffalo Field Office (BFO), (1985/2001).

This approval is subject to adherence with all of the operating plans, design features, and mitigation measures contained in the Master Surface Use Plan of Operations, Drilling Plan, Water Management Plan, and information in individual APDs. This approval is also subject to operator compliance with all mitigation and monitoring requirements contained within the Powder River Oil and Gas Project Final Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS) approved April 30, 2003.

**RATIONALE:**

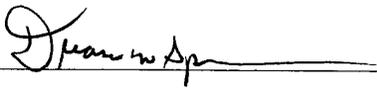
The decision to authorize the selected alternative, as summarized above, is based on the following:

1. The Operator, in their project, has committed to:
  - Comply with all applicable Federal, State and Local laws and regulations.
  - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, and relevant air quality permits.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowners.
3. The selected alternative will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as this development will help meet the nation's energy needs, and will help to stimulate local economies by maintaining workforce stability.
5. The selected alternative incorporates appropriate local greater sage-grouse research and the best available science from across the species' range in development of the attached conditions of approval.

- Mitigation measures were selected to alleviate environmental impacts and meet the project's purpose and need. Mitigation is discussed in the environmental consequences section of the attached EA. For a complete description of all site-specific COA's associated with this approval, see sections 2.2.2-2.2.3.4. in the attached EA.

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

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

Field Manager:  Date: 7/6/2010

**FINDING OF NO SIGNIFICANT IMPACT  
FOR  
EOG Resources, Inc.  
Project 785  
ENVIRONMENTAL ASSESSMENT –WY-070-EA10-238**

**FINDING OF NO SIGNIFICANT IMPACT:**

On the basis of the information contained in the EA, and all other information available to me, it is my determination that: (1) the implementation of Alternative B will not have significant environmental impacts beyond those already addressed in PRB EIS to which the EA is tiered; (2) Alternative B is in conformance with the Buffalo Field Office Resource Management Plan (1985, 2001); and (3) Alternative B does not constitute a major federal action having a significant effect on the human environment. Therefore, an environmental impact statement or a supplement to the existing environmental impact statement is not necessary and will not be prepared.

This finding is based on my consideration of the Council on Environmental Quality's (CEQ) criteria for significance (40 CFR '1508.27), both with regard to the context and to the intensity of the impacts described in the EA.

**CONTEXT:**

Mineral development (coal, oil and gas, bentonite, and uranium) is a long-standing and common land use within the Powder River Basin. More than one fourth of the nation's coal production comes from the Powder River Basin. The PRB FEIS reasonably foreseeable development predicted and analyzed the development of 51,000 CBNG wells and 3,200 oil wells. The additional oil well development described in Alternative B is insignificant within the national, regional, and local context.

**INTENSITY:**

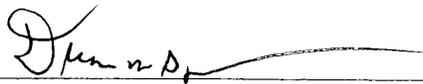
The implementation of Alternative B will result in beneficial effects in the forms of energy and revenue production however; there will also be adverse effects to the environment. Design features and mitigation measures have been included within Alternative B to prevent significant adverse environmental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

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

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

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

There are no cultural or historical resources present that will be adversely affected by the selected alternative. 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.

Field Manager:  Date: 7/6/2010

**BUREAU OF LAND MANAGEMENT  
BUFFALO FIELD OFFICE  
ENVIRONMENTAL ASSESSMENT  
EA # WY-070-EA10-238**

1. INTRODUCTION

This site-specific analysis follows, and incorporates by reference, the information and analysis contained in the Powder River Basin Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS), #WY-070-02-065 (approved April 30, 2003), pursuant to Title 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21. The PRB FEIS is available for review at the Bureau of Land Management (BLM) Buffalo Field Office (FO). This Crossbow Multi-Well Pads Project (Project No. 785) environmental assessment (EA) addresses site-specific resources and impacts that were not specifically addressed within the PRB FEIS.

**1.1. Background**

- Notice of Staking (NOS) applications for the federal wells were submitted on October 7, 2009.
- Field inspections of the proposed well locations were conducted on March 18, 2010, by Meleah Corey, Jeff Jette, and Scott Jawors – BLM; Clint Goodman and Jennifer Yu – EOG Resources, Inc.; Chad Baker – SWCA Environmental Consultants; and Lee Isenberger (surface owner).
- Applications For Permit To Drill (APDs) were received on May 18, 2010 for the following wells:

Table 1. Well Pad Name/Location/Lease

Well Pad Name	Township	Range	QTR Section	Wells	Lease Number
Arbalest 01-02H	41N	72W	SESE Sec 2	Arbalest 01-02H, 02-02H	WYW-143518
Arbalest 09-23H	41N	72W	SESE Sec 23	Arbalest 09-23H, 10-23H	WYW-130047
Bolt 01-35H	42N	72W	SESE Sec 35	Bolt 01-35H, 02-15H, 03-35H, 04-35H	WYW-143526
Crossbow 07-06H	41N	71W	SESE Sec 6	Crossbow 07-06H, 08-06H, 09-06H, 10-06H, 11-06H, 12-06H	WYW-108556 WYW-147267
Crossbow 13-07H	41N	71W	SESE Sec 7	Crossbow 13-07H, 14-07H, 15-07H, 16-07H, 17-07H, 18-07H	WYW-147267 WYW-106828
Crossbow 20-06H	41N	71W	NENE Sec 6	Crossbow 20-06H, 21-06H, 22-06H, 23-06H, 24-06H, 25-06H	WYW-142772 WYW-108556
Crossbow 27-29H	41N	71W	NWNE Sec 29	Crossbow 27-29H, 26-29H, 28-29H, 29-29H, 30-29H, 31-29H	WYW-142771

- On May 18, 2010, BLM received the following from EOG Resources, Inc. for their pending Project No. 785 (34 conventional wells):
  - Revised Surface Use Plan.
  - Revised APD Cover Sheets with revised plats for following wells: Arbalest 09-23H and Bolt 01-35H

### **1.2. Purpose and Need**

The purpose of the proposed action is to explore for conventional oil and gas reserves conducted under the rights granted by a Federal oil and gas lease, as required in 43 CFR 3160, all Onshore Orders, and the Mineral Leasing Act, as amended and supplemented, (30 U.S.C 181 *et seq.*).

The need for the action is the requirement to obtain approval for the development of an Oil and Gas lease through APDs on public lands managed by the BLM under Onshore Order No. 1, pursuant to the authority of the Mineral Leasing Act, as amended and supplemented, (30 CFR U.S.C. 181 *et seq.*) and prescribed in 43 CFR Part 3160.

Decision to be Made: The BLM will decide whether or not to approve the proposed development of oil and gas resources on the federal leasehold referred to as Crossbow Multi-Well Pads, and if so, under what terms and conditions.

The operator submitted 34 Notice of Stakings (NOS) for the project. All 34 NOS's were onsite and analyzed in the EA. Of the 34 (NOS), nine were followed up with an application permit to drill (APD). The Decision Record outlines seven wells that are approved and two that are deferred.

### **1.3. Conformance with Applicable Land Use Plan and Other Environmental Assessments**

This proposed action is in conformance with the terms and conditions of the 1985 Approved Resource Management Plan (RMP) for the Public Lands administered by the BLM Buffalo FO and subsequent April 2001 update (BLM 1985, 2001), as well as the PRB FEIS (BLM 2003).

## **2. ALTERNATIVES INCLUDING THE PROPOSED ACTION**

Two alternatives (Alternative A and Alternative B) were evaluated in determining how to best meet the stated purpose and need of the proposed action. A brief description of each alternative follows.

### **2.1. Alternative A - No Action**

This alternative would consist of no new wells. The Department of Interior's authority to implement a "no action" alternative that precludes development is limited. An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove, and dispose of all oil and gas deposits" in the lease lands, "subject to the terms and conditions incorporated in the lease." The No Action Alternative is further described in the PRB FEIS, Volume 1, pages 2-54 through 2-62 (BLM 2003).

### **2.2. Alternative B – Proposed Action**

**OPERATOR/APPLICANT:** EOG Resources, Inc.

**PROJECT NAME:** Crossbow Multi-Well Pads (Project No. 785)

**AFFECTED SURFACE OWNERS:** Isenberger Land, LLC, Antelope Coal, LLC, Sioux Ranch, Inc.

**COUNTY:** Campbell

The Proposed Action is to explore for and possibly develop oil and natural gas reserves within geologic formations currently leased by EOG in Wyoming. EOG proposes to drill, complete, produce, and eventually reclaim up to 34 wells to the Mowry, Niobrara, and Turner formations from seven separate well pads. EOG's plan of development is to initially drill two horizontal well bores from each pad and determine whether the wells are economically viable for production. If the wells are economically viable, then up to 34 total wells would be drilled from the seven proposed well pads with either two, four, or six horizontal well bores on each pad (Table 1). The number of wells on each pad is dependent on spacing

rules, mineral estate, and geological factors. Using horizontal boring technology from centralized well pads will minimize surface disturbances and habitat fragmentation. Well pads would initially be built to accommodate drilling two horizontal well bores. The well pads may subsequently be expanded by 32 feet on one side to accommodate each two additional wells. For a six-well pad, one side could be expanded by 64 feet to accommodate the additional four wells. The life of each productive well is anticipated to be up to 40 years. Associated infrastructure would only include access roads. No gathering pipelines, power lines, or transmission lines are proposed at this time since the proposed wells are exploratory wells and product recovery and production viability is unknown. Any future gathering pipelines, power lines, transmission lines, or other infrastructure would be analyzed in a separate NEPA document.

The project area is generally located approximately 13 miles south of the town of Wright and approximately 20 miles northeast of Bill, Wyoming, along Wyoming State Highway 59 in Campbell County (Figures 1 and 2). Surface ownership in the project area is private (fee), and mineral ownership is a combination of both federal and private.

**Well Pads:**

Well pads would be constructed from the native sand/soil/rock materials present on site at each well pad location. Well pad locations would be initially leveled to create a flat workable surface for drilling equipment. A level pad would be achieved through the balancing of both cuts and fills to alleviate the need for imported materials. Cut-and-fill slopes would be designed to allow for maximum retention of topsoil and subsoil fill material. Prior to well pad cuts and fills, topsoil and native vegetation would be stripped and removed from the pad footprint for future use during the reclamation process. The stockpiling of topsoil and stripped vegetation will allow for a native seed bank that should facilitate the re-establishment of vegetation.

**Figure 1. Project location in Campbell County, Wyoming.**

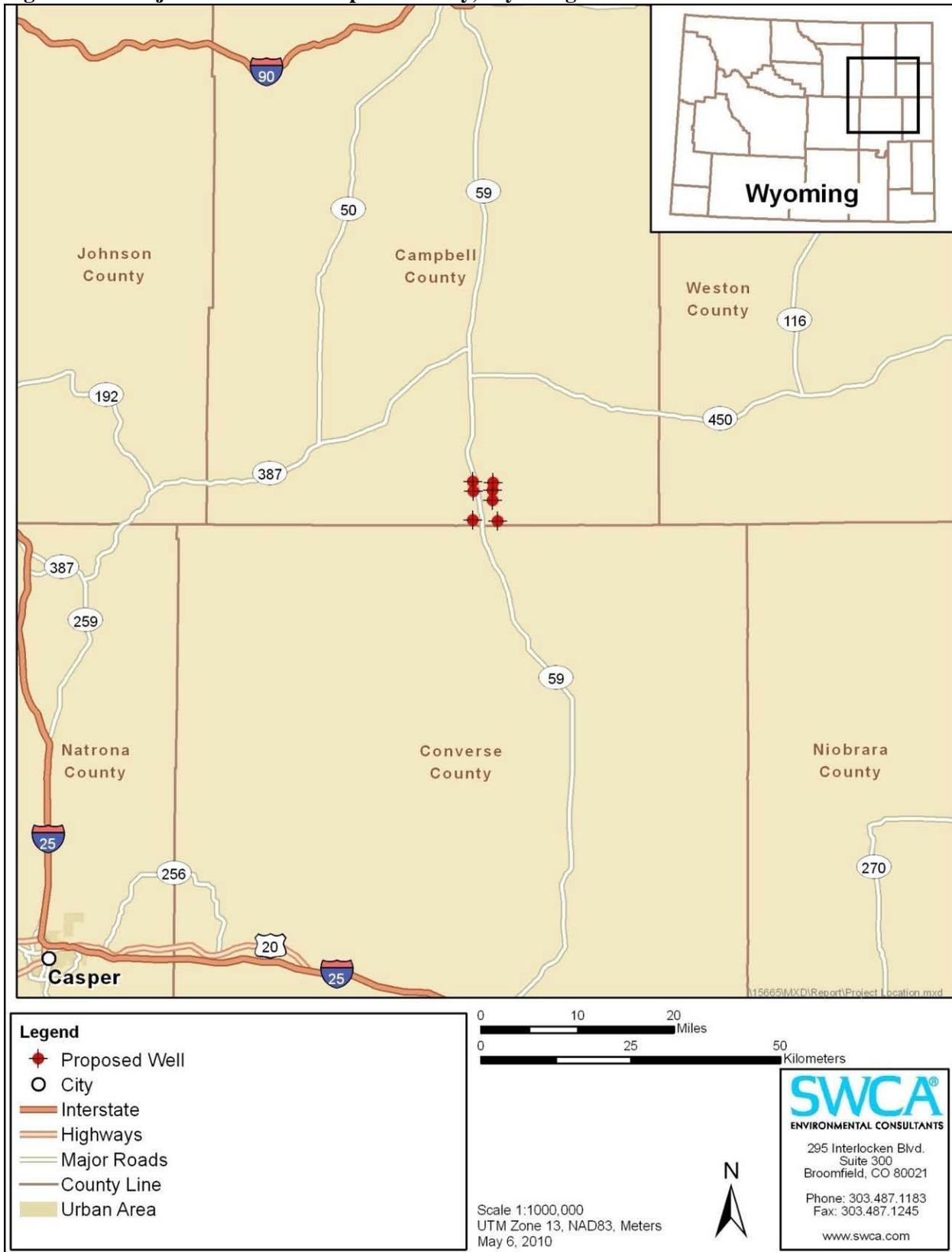
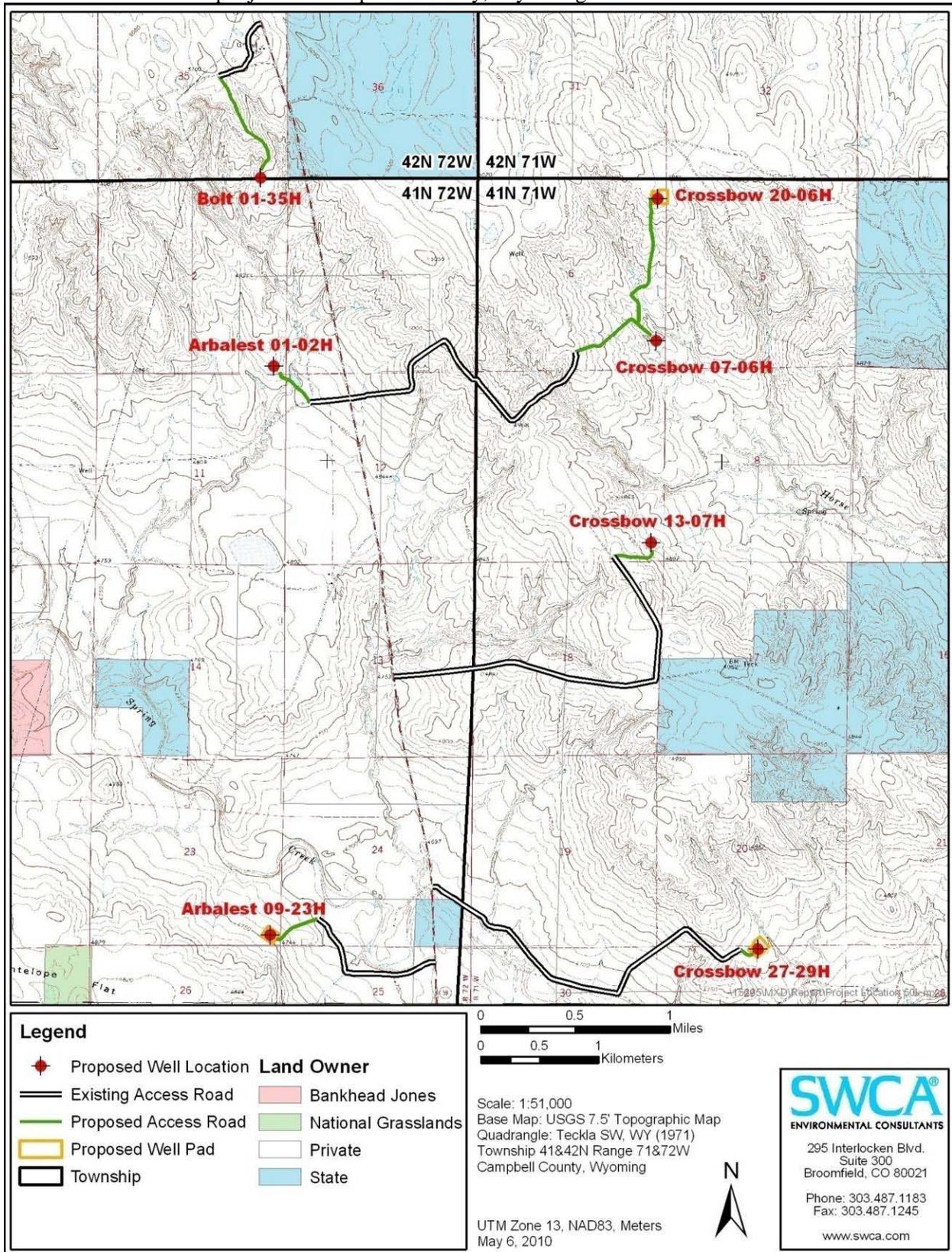


Figure 2. Map of proposed well locations, access routes, and surface ownership for the Crossbow multi-well project in Campbell County, Wyoming.



The well pads would initially accommodate two horizontal well bores, but could be expanded by 32 feet on one side of the location for each pair of additional bores if more than two bores are desired on any well. Surface disturbances for each well pad vary slightly depending on the amount of cuts, fills, associated side slopes, and soil stockpiling. See Tables 2 and 3 for estimated surface disturbances associated with each proposed well pad. In total, 28.42 acres of surface disturbance would be required to drill all 34 wells on the seven pads, including all reserve pits and soil piles. EOG will stabilize the well site upon construction of the well pad (methods of stabilization may include hydro mulch, hydro seed, erosion waddles, erosion fabric, ECT). Upon the wells the well being drill and completed interim reclamation will begin. After successful interim reclamation, the remaining surface disturbance for the seven well pads would total approximately 17 acres (assuming all 34 wells are drilled).

**Access:** Primary access to the project area is from Wyoming State Highway 59, which runs generally north/south through the project area. New access roads would be constructed off of existing well field access roads to access each proposed well pad (Figure 2). Existing roads and newly-built 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. Approximately 2.62 miles of new access roads would be required to provide equipment and vehicle access to the proposed well pads. New access road construction would result in approximately 12.75 acres of surface disturbance (Tables 2 and 3).

For specifics, refer to the Master Surface Use Plan (MSUP) in the Plan of Development (POD). For a detailed description of design features, construction practices associated with the proposed action refer to the Surface Use Plan (SUP) and the Drilling Plan associated with the APDs. Also see the subject APDs for maps showing the proposed well locations and associated facilities described above. See engineered drawings in the BLM well files for production facility diagrams and interim reclamation areas.

Table 2. Summary of Proposed Wells

<b>Well Pad Name</b>	<b>Total Depth</b>	<b>Maximum # of wells</b>	<b>Acres of Disturbance</b>	<b>Acres of Interim Reclamation</b>	<b>Access Road Miles</b>	<b>Access Road Acres</b>
Arbalest 01-02H	14,720	2	4.19	1.71	0.23	1.13
Arbalest 09-23H	14,653	2	4.19	1.39	0.25	1.22
Bolt 01-35H	14,711	4	3.70	1.62	0.60	2.92
Crossbow 07-06H	13,920	6	3.67	1.87	0.49	2.39
Crossbow 13-07H	14,292	6	4.44	2.00	0.24	1.15
Crossbow 20-06H	15,139	6	3.52	1.92	0.73	3.55
Crossbow 27-29H	16,400	6	4.71	1.87	0.08	0.39
<b>Total</b>		<b>34 wells</b>	<b>28.42 acres</b>	<b>12.38 acres</b>	<b>2.62 miles</b>	<b>12.75 acres</b>

Table 3. Surface Disturbances

Activity	Length (feet)	Width (feet)	Acres of Disturbance
<b>Arbalest 01-02H</b>			
Well Pad	432	345	3.42
Cut/fills & Topsoil/spoil stockpile	Varies	Varies	0.77
Access Road	1,234	40	1.13
Total Initial Disturbance			5.32
<b>Arbalest 09-23H</b>			
Well Pad	400	345	3.17
Cut/fills & Topsoil/spoil stockpiles	Varies	Varies	1.02
Access Road	1,331	40	1.22
Total Initial Disturbance			5.41
<b>Bolt 01-35H</b>			
Well Pad	432	335	3.32
Cut/fills & Topsoil/spoil stockpiles	Varies	Varies	0.38
Access Road	3,182	40	2.92
Total Initial Disturbance			6.22
<b>Crossbow 07-06H</b>			
Well Pad	464	315	3.35
Cut/fills & Topsoil/spoil stockpiles	Varies	Varies	0.32
Access Road	2,608	40	2.39
Total Initial Disturbance			6.06
<b>Crossbow 13-07H</b>			
Well Pad	464	345	3.67
Cut/fills & Topsoil/spoil stockpiles	Varies	Varies	0.77
Access Road	1,255	40	1.15
Total Initial Disturbance			5.59
<b>Crossbow 20-06H</b>			
Well Pad	444	345	3.52
Cut/fills & Topsoil/spoil stockpiles	Varies	Varies	0.34
Access Road	3,869	40	3.55
Total Initial Disturbance			7.41
<b>Crossbow 27-29H</b>			
Well Pad	464	345	3.68
Cut/fills & Topsoil/spoil stockpiles	Varies	Varies	1.03
Access Road	422	40	0.39
Total Initial Disturbance			5.10

**2.2.1. Operator Committed Measures**

The Operator has incorporated several measures to alleviate resource impacts into the MSUP, submitted to BLM on May 18, 2010. Refer to the MSUP pages 1-11, for the complete details of Operator committed measures.

Implementation of committed mitigation measures contained in the SUP and Drilling Program, in addition to the Standard Conditions of Approval (COAs) contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

Additionally, the Operator, in their APD, has committed to:

1. Obtain the necessary permits from other agencies for the drilling, completion and production of this well including water rights appropriations, and relevant air quality permits.

**2.2.2. Surface Use Site-Specific Conditions of Approval:**

1. 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.

**2.2.3. Description of Mitigation Measures (applied as Conditions of Approval)**

1. The Operator is responsible for the COAs attached to this EA and may be issued an Incident of Non-Compliance if found to be in violation of any COA.

**2.2.3.1. Wildlife**

1. The project area and 0.5-mile buffer would be surveyed for raptor nest activity by a biologist prior to construction activities between April 15 and June 15.
2. Surface disturbance activities would be restricted within 0.5 mile of an occupied raptor nest between February 1 and July 31.

**2.2.3.2. Cultural or Historic Values**

1. The Operator is responsible for informing all persons who are associated with the project operations that they would be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts.
2. If subsurface archaeological features are located during ground disturbing activities during well pad or access road clearing or construction, all such activities on the well pad are to cease immediately within 30 meters (100 feet) of the discovery. The Authorizing Officer (AO) (i.e., Field Manager or his/her acting) are to be notified immediately. Within five working days the AO would inform the Operator as to:
  - a. whether the subsurface features or materials found during construction appear eligible for the NRHP.
  - b. the mitigation measures the Operator would likely have to undertake before the site can be used (assuming that in situ preservation is not necessary).
  - c. a timeframe for the AO to complete an expedited review under 36 CFR 800-11 to confirm, through the State Historic Preservation Officer (SHPO), that the findings of the AO are correct and that the mitigation is appropriate.
  - d. At any time, if the Operator wishes to relocate the construction activities to avoid the expense of mitigation and/or the delays associated with the process, the AO would take on the responsibility of recording and/or stabilizing the exposed materials, if required. Mitigation technical guidelines and procedures would be provided by the AO. The Operator may resume construction once the AO has verified that mitigation is complete.
  - e. Pursuant to 43 CFR 10.4 (g) the holder of the authorization must notify the AO, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Pursuant to 43 CFR 10.4 (c) and (d), the operator or the operator's contractors must stop activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the AO.

### **2.2.3.3. Air Quality**

1. During construction, emissions of particulate matter from well pad and resource road construction will be minimized by application of water, or other dust suppressants, with at least 50 percent control efficiency. Roads and well locations constructed on soils susceptible to wind erosion could be appropriately surfaced or otherwise stabilized to reduce the amount of fugitive dust generated by traffic or other activities, and dust inhibitors (surfacing materials, non-saline dust suppressants, and water) could be used as necessary on unpaved collector, local, and resource roads that present a fugitive dust problem. The use of chemical dust suppressants on any BLM surface will require prior approval from the BLM AO.

### **2.2.3.4. Surface Water/Wetlands and Riparian**

1. Implement site BMPs during construction and reclamation to mitigate secondary impacts to wetland and riparian resources. Straw wattles and roadside diversions would be installed and maintained in accordance with requests by BLM personnel at on-site visits and all applicable stormwater prevention plans and BMPs.

### **2.3. Alternatives Considered but Eliminated from Detailed Study**

An alternative was considered for relocation of the Crossbow 07-06H access road, but EOG confirmed following the on-sites that this was not feasible from a construction and operations standpoint due to the sharp turns in the alternate access route. Based on the on-site inspection, existing two-tracks nearby are not feasible for use during construction and operation and would need to be realigned and rebuilt, resulting in similar or greater surface disturbance due to increased length of access route.

An alternative was considered to drill each well, or each set of two wells, from separate pads. EOG's planning determined that this would result in unnecessary increased surface disturbance; therefore, this alternative was eliminated from detailed study.

### **3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION & ALTERNATIVES**

This section describes the environment that would be affected by implementation of the Alternatives described in Section 2. Aspects of the affected environment described in this section focus on the relevant major issues.

The following are not present in the project area and will not be further analyzed:

1. Floodplains
2. Wilderness Values
3. Areas of Critical Environmental Concern
4. Prime or Unique Farmlands
5. Wild and Scenic Rivers
6. Native American Religious Concerns
7. Environmental Justice Concerns

### 3.1. Topographic Characteristics

The project area ranges in elevation from approximately 4,700 to 5,000 feet above sea level. The drainages in the vicinity include Horse Creek and Spring Creek. The topography of the area is flat to rolling grasslands with minimal sagebrush inclusion. The area falls within a 12- to 16-inch precipitation zone, with most of the precipitation falling during late winter and spring. The surface ownership in the general area is a mixture of private, state, and BLM surface, with cattle grazing, coal mining, and oil and gas development being the primary surface uses.

### 3.2. Vegetation & Soils

#### 3.2.1. Vegetation

The project area is characterized by flat to rolling shortgrass prairie with minimal big sagebrush (*Artemisia tridentata* and *A. tridentata* ssp. *wyomingensis*) inclusion. The area around the well pads and access roads is dominated by grasses including western wheatgrass (*Pascopyrum smithii*), slender wheatgrass (*Elymus trachycaulus*), crested wheatgrass (*Agropyron cristatum*), needle and thread grass (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), and cheatgrass (*Bromus* sp.) (Table 4). Other species found during surveys include, pricklypear (*Opuntia* sp.), yellow alyssum (*Alyssum alyssoides*), Russian thistle (*Salsola tragus*), and Indian ricegrass (*Achnatherum hymenoides*).

Table 4. Dominant Vegetation at Well Pads and Access Roads

Well Pad ID	Dominant Vegetation	Conditions
Arbalest 01-02H	Western wheatgrass, blue grama, pricklypear, yellow alyssum, cheatgrass	Cattle and sheep grazing pasture
Arbalest 09-23H	Western wheatgrass, blue grama, cheatgrass, pricklypear, Russian thistle	Sheep grazing open grasslands
Bolt 01-35H	Western wheatgrass, blue grama, needle and thread, big sagebrush, pricklypear	Low growing sagebrush
Crossbow 07-06H	Western wheatgrass, crested wheatgrass, slender wheatgrass, needle and thread grass, blue grama, big sagebrush, pricklypear, yellow alyssum, Indian ricegrass, cheatgrass	Sheep grazed grasslands and sagebrush
Crossbow 13-07H	Western wheatgrass, blue grama, Indian ricegrass, cheatgrass, big sagebrush	Low growing sagebrush, sheep grazing
Crossbow 20-06H	Western wheatgrass, blue grama, cheatgrass, Indian ricegrass, needle and thread grass, big sagebrush, pricklypear	Sagebrush mixed with sheep grazed grasslands
Crossbow 27-29H	Blue grama, western wheatgrass, slender wheatgrass, big sagebrush, cheatgrass, Russian thistle, pricklypear, yellow alyssum	Sheep grazing grasslands mixed with sagebrush

#### 3.2.1.1. Invasive, Nonnative Species

Twenty-five invasive plant species are listed on the State of Wyoming Designated Noxious Weeds and Prohibited Noxious Weeds list (State of Wyoming 2008a). No species are listed on the Campbell County Declared List of Weeds and Pests (State of Wyoming 2008b). No state-listed noxious weed populations or weeds of concern have been observed within the project area. However, cheatgrass (an opportunistic grass and prolific seed producer) was observed throughout the project area during the biological surveys. Russian thistle (also known as tumbleweed) is another weed found at Arbalest 09-23H and Crossbow 27-29H. This weed invades areas with disturbed soils such as areas along ROWs, well pads, and fencelines.

### **3.2.2. Soils**

The Natural Resources Conservation Service (NRCS) has mapped soils in the proposed project area. Figure 3 displays the soils composition that surrounds each proposed well pad and associated access road. Soils complexes derived from different soils series that are mapped on the well pads and access roads, and their respective acreages, are summarized in Table 5. The acreage shown is based on the spatial extent of soil series combinations derived from NRCS data; therefore, the acreage is approximate and used as a best estimate of soil series distribution at each of the proposed project areas.

Figure 3. Soils map for the project area.

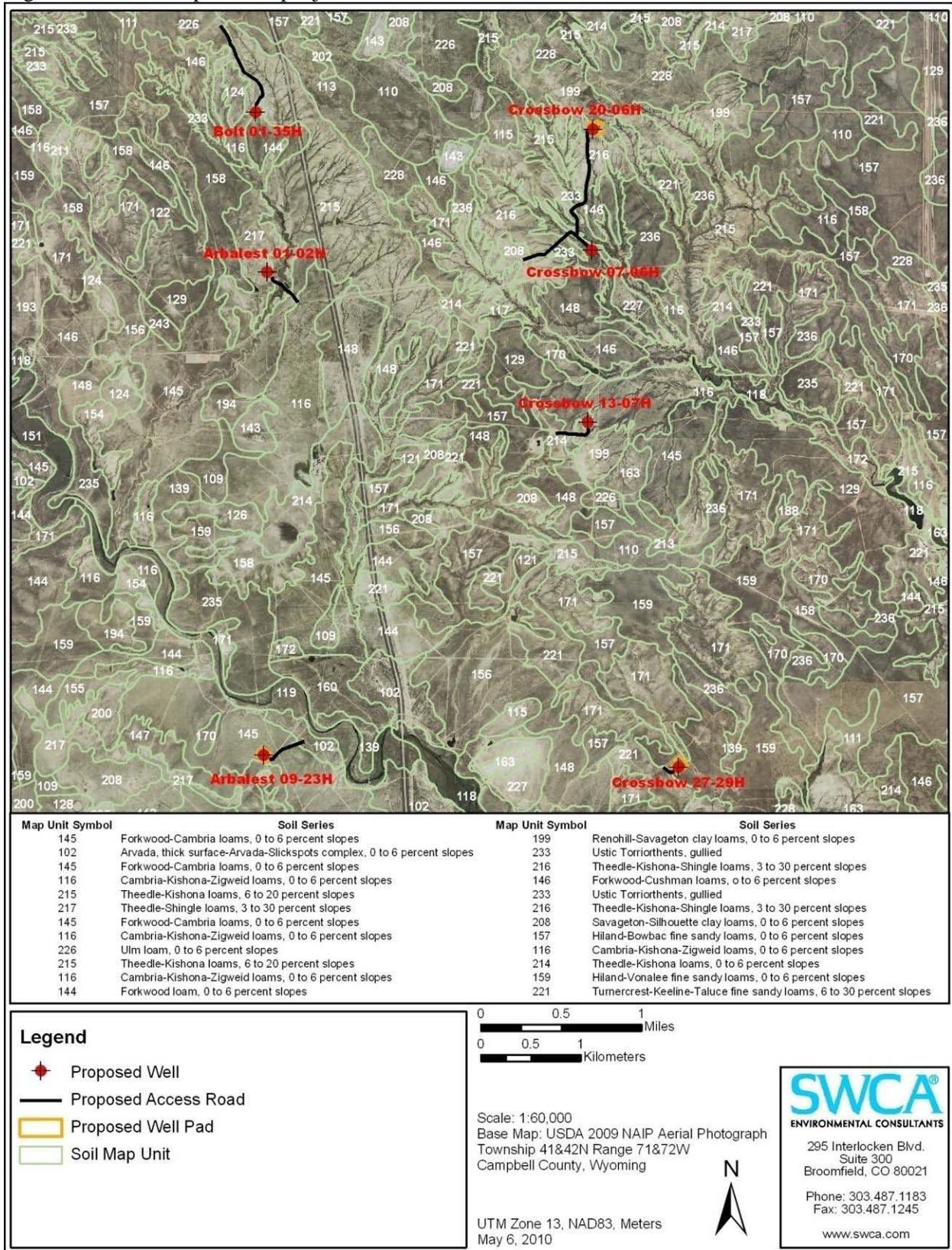


Table 5. Soil Types at Well Pads and Access Roads

Well Pad ID	Map Unit	Soil Series	Acres
Arbalest 01-02H	215	Theedle-Kishona loams, 6 to 20 percent slopes	1.04
	217	Theedle-Shingle loams, 3 to 30 percent slopes	2.92
	145	Forkwood-Cambria loams, 0 to 6 percent slopes	0.13
	116	Cambria-Kishona-Zigweid loams, 0 to 6 percent slopes	0.01
Arbalest 09-23H	145	Forkwood-Cambria loams, 0 to 6 percent slopes	3.57
	102	Arvada, thick surface-Arvada-Slickspots complex, 0 to 6 percent slopes	0.08
Bolt 01-35H	226	Ulm loam, 0 to 6 percent slopes	0.28
	215	Theedle-Kishona loams, 6 to 20 percent slopes	0.97
	116	Cambria-Kishona-Zigweid loams, 0 to 6 percent slopes	1.04
	144	Forkwood loam, 0 to 6 percent slopes	2.20
Crossbow 07-06H	233	Ustic Torriorthents, gullied	2.13
	216	Theedle-Kishona-Shingle loams, 3 to 30 percent slopes	2.43
	208	Savageton-Silhouette clay loams, 0 to 6 percent slopes	0.11
Crossbow 13-07H	157	Hiland-Bowbac fine sandy loams, 0 to 6 percent slopes	3.03
	116	Cambria-Kishona-Zigweid loams, 0 to 6 percent slopes	1.21
	214	Theedle-Kishona loams, 0 to 6 percent slopes	0.15
Crossbow 20-06H	199	Renohill-Savageton clay loams, 0 to 6 percent slopes	1.71
	233	Ustic Torriorthents, gullied	0.26
	216	Theedle-Kishona-Shingle loams, 3 to 30 percent slopes	3.25
	146	Forkwood-Cushman loams, 0 to 6 percent slopes	0.02
Crossbow 27-29H	159	Hiland-Vonalee fine sandy loams, 0 to 6 percent slopes	3.97
	221	Turnercrest-Keeline-Taluce fine sandy loams, 6 to 30 percent slopes	0.11

Soils in the project area are described as fine or fine-loamy, mixed, superactive, mesic Ustic Haplargids. The major component of each soil complex is described below. More information is available in the *Soil Survey of Campbell County, Wyoming* (NRCS 2007).

**Arvada Series:** The Arvada series consists of very deep, well-drained soils formed in alluvium and colluvium derived from sodic or high sodium concentrated shale. These fine soils are found on alluvial fans, fan remnants, fan terraces, and hillslopes with slopes of 0 to 25 percent.

**Cambria Series:** The Cambria series consists of fine-loamy, 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 percent and are usually simple but may be complex where the area has been dissected by ephemeral streams.

**Forkwood Series:** The Forkwood series consists of very deep, well-drained soils formed in alluvium. Forkwood soils are fine-loamy soils found on terraces, alluvial fans, fan remnants, hills, ridges, and pediments where slopes range from 0 to 15 percent.

**Hiland Series:** The Hiland series consists of very deep, well-drained soils formed in alluvium or eolian deposits on relict surfaces consisting of terraces, fans, fan remnants pediments, ridges, hills, and stabilized dunes. These fine-loamy soils are moderately permeable and have slopes ranging from 0 to 20 percent.

**Renohill Series:** The Renohill series consists of well-drained soils that are moderately deep to soft bedrock. These fine soils formed in alluvium, colluvium, and residuum. Renohill soils are on bedrock controlled plateaus, alluvial fans, hills, and ridges with slopes that are 0 to 30 percent.

**Savageton Series:** The Savageton series consists of moderately deep, well-drained, slowly permeable soils. They are fine soils formed in alluvium, colluvium, and residuum derived dominantly from shale on hills, ridges, fan remnants, fan piedmonts, and fan aprons where slopes range from 0 to 30 percent.

**Theedle Series:** The Theedle series consists of well-drained soils that are moderately deep to soft bedrock. These fine-loamy soils formed in residuum and slope alluvium weathered from soft sandstone. The Theedle soils are on hills, ridges, and fan remnants with slopes of 0 to 75 percent.

**Turnercrest Series:** The Turnercrest soils consist of moderately deep, well-drained soils formed in eolian or alluvium deposits and residuum derived from soft sandstone. They are coarse-loamy soils found on bedrock-controlled hills, fan remnants, ridges, and structural benches where slopes range from 0 to 30 percent.

**Ulm Series:** The Ulm series consists of very deep, well-drained soils that formed in calcareous alluvium derived from sedimentary rock. Ulm soils are fine soils located on relict terraces, alluvial fans, fan remnants, plateaus, ridges, and hills with slopes that are 0 to 18 percent.

### 3.3. Wildlife

The project area is characterized by flat to rolling shortgrass prairie with minimal sagebrush inclusion. Wildlife that may potentially occur in this habitat type include several migratory bird and raptor species. Red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*B. swainsoni*), American kestrel (*Falco sparverius*), and golden eagle (*Aquila chrysaetos*) and ferruginous hawks (*B. regalis*) are known to nest in the area and nests have historically been recorded within 0.5 mile of proposed well pads (BLM 2009). These historical nests along with some additional new nest structures were identified during surveys in September 2009 and were reevaluated for evidence of nesting activity during May and June 2010 surveys. One active ferruginous hawk nest was observed near Crossbow 20-06H; all other raptor nests were inactive. Migratory birds observed during 2009 and 2010 surveys included western meadowlark (*Sturnella neglecta*), horned lark (*Eremophila alpestris*), killdeer (*Charadrius vociferous*), mourning dove (*Zenaida macroura*), common raven (*Corvus corax*), great-horned owl (*Bubo virginianus*), and red-tailed hawk. Mammals observed included pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), black-tailed prairie dog (*Cynomys ludovicianus*), Wyoming ground squirrel (*Spermophilus elegans*), and cottontail (*Sylvilagus nuttallii*). A list of wildlife species typical of shortgrass prairie in the region is provided in the PRB FEIS (BLM 2003).

Wyoming Game and Fish Department (WGFD) maps were reviewed to determine whether the proposed new well sites and access roads are located in big game ranges, parturition areas, or migration corridors. Arbalest 09-23H, Crossbow 13-07H, and Crossbow 27-29H are within mule deer year-long range. The closest mule deer winter year-long range is about 2.7 miles southwest of Arbalest 09-23H. All wells are in the year-long range for pronghorn. The closest winter year-long range is 4.5 miles northeast of Crossbow 20-06H.

#### 3.3.1. Threatened, Endangered, and Sensitive Species

The U.S. Fish and Wildlife Service (USFWS) list of endangered, threatened, and candidate species for Campbell County, Wyoming (USFWS 2008), the BLM Wyoming sensitive species list (BLM 2010a), and the Buffalo FO RMP (BLM 1985, 2001), and PRB FIES (BLM 2003) were consulted to determine species potentially affected by the proposed action (Table 6).

Table 6. USFWS-Listed and BLM Buffalo Field Office Sensitive Species

Species	Scientific Name	Status	Status in Project Area
<b>Mammals</b>			
Long-eared myotis	<i>Myotis evotis</i>	BLM sensitive	Unlikely; no suitable habitat
Fringed myotis	<i>Myotis thysanodes</i>	BLM sensitive	Unlikely; no suitable habitat
Spotted bat	<i>Euderma maculatum</i>	BLM sensitive	Outside known range
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	BLM sensitive	Unlikely; no suitable habitat
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	BLM sensitive	Known colonies within one mile
Black-footed ferret	<i>Mustela nigripes</i>	USFWS endangered	Not present; no suitable habitat
Swift fox	<i>Vulpes velox</i>	BLM sensitive	Known
<b>Birds</b>			
Trumpeter swan	<i>Cygnus buccinators</i>	BLM sensitive	Unlikely; no suitable habitat
White-faced ibis	<i>Plegadis chihi</i>	BLM sensitive	Unlikely; no suitable habitat
Northern goshawk	<i>Accipiter gentilis</i>	BLM sensitive	Unlikely; no suitable habitat
Bald eagle	<i>Haliaeetus leucocephalus</i>	BLM sensitive	Possible roosting and foraging
Ferruginous hawk	<i>Buteo regalis</i>	BLM sensitive	Known nests within one mile
Peregrine falcon	<i>Falco peregrinus</i>	BLM sensitive	Possible
Greater sage-grouse	<i>Centrocercus urophasianus</i>	USFWS candidate	Possible; known leks within four miles
Plains sharp-tailed grouse	<i>Tympanuchus phasianellus jamesi</i>	Local importance.	Not known to occur
Mountain plover	<i>Charadrius montanus</i>	BLM sensitive	Possible; suitable habitat within one mile
Long-billed curlew	<i>Numenius americanus</i>	BLM sensitive	Possible
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	BLM sensitive	Unlikely; no suitable habitat
Burrowing owl	<i>Athene cunicularia</i>	BLM sensitive	Possible; suitable habitat within one mile
Sage thrasher	<i>Oreoscoptes montanus</i>	BLM sensitive	Possible
Loggerhead shrike	<i>Lanius ludovicianus</i>	BLM sensitive	Possible
Brewer's sparrow	<i>Spizella breweri</i>	BLM sensitive	Possible
Sage sparrow	<i>Amphispiza belli</i>	BLM sensitive	Possible
Baird's sparrow	<i>Ammodramus bairdii</i>	BLM sensitive	Possible
<b>Fish</b>			
Yellowstone cutthroat trout	<i>Oncorhynchus clarki bouvieri</i>	BLM sensitive	Not present; outside known range
<b>Amphibians</b>			
Northern leopard frog	<i>Rana pipiens</i>	BLM sensitive	Unlikely; no suitable habitat
Columbia spotted frog	<i>Rana luteiventris</i>	BLM sensitive	Outside known range
<b>Plants</b>			
Porter's sagebrush	<i>Artemisia porteri</i>	BLM sensitive	Outside known range
Williams' wafer-parsnip	<i>Cymopterus williamsii</i>	BLM sensitive	Outside known range
Blowout penstemon	<i>Penstemon haydenii</i>	USFWS endangered	Unlikely; no suitable habitat

Species	Scientific Name	Status	Status in Project Area
Limber pine	<i>Pinus flexilis</i>	BLM sensitive	Unlikely; no suitable habitat
Ute ladies'-tresses	<i>Spiranthes diluvialis</i>	USFWS threatened	Unlikely; no suitable habitat

No USFWS-listed species are known to occur in the project area or immediate vicinity. Several BLM sensitive species are unlikely to occur in the project area due to lack of suitable habitat. Bird species listed as “possible” in the above table may occur in or near the project area on an irregular basis or fly through the area occasionally. These bird species are most likely to occur only during periods of migration, except for mountain plover and burrowing owl which use prairie dog colonies for nesting. Other species listed in Table 6 as “unlikely” or “possible” are not expected to regularly occur in the project area and are not discussed further in this EA.

### 3.3.1.1. Threatened, Endangered, and Candidate Species

#### 3.3.1.1.1. Black-footed ferret

The black-footed ferret is listed as endangered under the Endangered Species Act (ESA). The affected environment for black-footed ferrets is discussed in the PRB FEIS. A black-footed ferret population requires at least 1,000 acres of prairie dog colonies, separated by no more than 1.5 km, for survival (USFWS 1989). Black-footed ferret habitat is not present within the project area. No prairie dog colonies are located within 0.5 mile of the well pad sites or access road ROWs, but some colonies are within 1 mile of the well pad locations (see BLM Sensitive Species section). These colonies are all less than 1,000 acres in size; the largest colony is approximately 11 acres.

#### 3.3.1.1.2. Greater Sage-grouse

Greater sage-grouse is a candidate for listing under the ESA. Wyoming has identified greater sage-grouse core areas that contain important nesting or breeding grounds. The closest core area (known as E Clareton) is 14.5 miles to the east of Crossbow 27-29H (State of Wyoming 2009). There are no greater sage-grouse leks within the project area. The nearest lek is 2.28 miles north of the Bolt 01-35H well pad location. Sage-grouse from the lek may occasionally use the mainly rolling short grass prairie with sagebrush inclusions of the project area. There are no other leks within a 4-mile radius of well locations.

#### 3.3.1.1.3. Blowout Penstemon

Blowout penstemon is listed as endangered under the ESA. Suitable blowout penstemon habitat consists of sparsely vegetated, early successional, shifting sand dunes and blowout depressions created by wind. In Wyoming, the habitat is typically found on sandy aprons or the lower half of steep sandy slopes deposited at the base of granitic or sedimentary mountains or ridges. The proposed project area does not contain habitat with these characteristics, and blowout penstemon is not expected to occur.

#### 3.3.1.1.4. Ute Ladies'-Tresses Orchid

Ute ladies'-tresses is listed as threatened under the ESA. The affected environment for Ute ladies'-tresses is discussed in the PRB FEIS. Drainages with documented orchid populations include Wind Creek and Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County. A WYNDD model predicts undocumented populations may be present particularly within southern Campbell and northern Converse Counties. The project area lacks perennial streams, and Ute ladies'-tresses is not expected to occur.

### 3.3.1.2. BLM Sensitive Species

No black-tailed prairie dog colonies are located at the well pad sites or access road ROWs, but several are within 1 mile of the well pad locations. The closest prairie dog colony is located approximately 0.5 mile

south of Crossbow 13-07. Two colonies are within a mile of Bolt 01-35H; one colony is a mile southwest of Arbalest 09-23H; and one colony is less than a mile northwest of Crossbow 27-29H. Other sensitive species, including mountain plover, burrowing owl, and bald eagle, may use these nearby prairie dog colonies.

Mountain plover are known from southeastern Campbell County (Smith and Keinath 2004) and may potentially nest in or near the project area. The BLM database indicates that four observations have been recorded approximately 1.1 to 1.8 miles southwest of Arbalest 09-23H in section 27 of T41N, R72W (BLM 2009). One additional observation was recorded approximately 1.6 miles south of Arbalest 09-23H in section 36 of T41N, R72W (BLM 2009). No mountain plovers were observed during surveys in May and June 2010 in the vicinity of the proposed Arbalest 09-23H well pad and access road. The species prefers areas with short herbaceous vegetation in flat topography with some measure of disturbance, typically heavy grazing (e.g., prairie dog colonies, sheep and cattle grazing allotments). These habitat characteristics are found in the project vicinity and surrounding landscape, such as the prairie dog colonies within one mile. Since potential habitat is known within one mile, the mountain plover may occur in the project area on an irregular basis. Burrowing owls may also use the nearby prairie dog colonies for nesting and could occur in the project area on an irregular basis.

Swift fox are known to occur in the project area. A personal communication with the landowner during on-sites suggests that an active swift fox den may be present near the Arbalest 09-23H well pad. A search for this den was conducted during mountain plover surveys in May and June 2010 and found two dens in the vicinity of the Arbalest 09-23H, but the dens lacked evidence of recent use (i.e. digging, prey remains, tracks) and no foxes were observed in the area.

Bald eagle nests are not likely to nest in the project area due to lack of suitable nesting sites and no records exist in the BLM database for bald eagle nests within 1-mile of any of the proposed well pad locations. However, bald eagles may hunt and roost in the project area and vicinity. A record in the BLM database exists for a historic bald eagle winter roost in section 24 of T41N, R72W. The roost tree is approximately 150 meters west of Wyoming State Highway 59 in a single cottonwood tree near Spring Creek. The roost tree is approximately 0.8 mile from the proposed Arbalest 09-23H. In 2004, a nest in the same roost tree was recorded as an active red-tailed hawk nest and the nest was recorded in 2006 as an active great-horned owl. It is assumed that due to the lack of open water for hunting in the project vicinity, bald eagles would be hunting at prairie dog colonies or eating road-killed carrion in the winter from the nearby state highway and are likely adapted to disturbance from road traffic and nearby well and mining operations.

Ferruginous hawk are known to nest in the project area and vicinity and would likely use the project area for foraging. The BLM raptor database (BLM 2009) indicates nine ferruginous hawk ground nests within 0.5 mile of the proposed well locations: four nests near Arbalest 09-23H and five near Bolt 01-35H (Table 7). A cluster of nests (territory), with one active, was discovered in 2010 near the Crossbow 20-06H. A ferruginous hawk pair uses a number of nests throughout their lives, usually switching between nests each year. The project area apparently has three ferruginous hawk territories, one inactive territory near the Bolt 01-35H, one inactive territory near the Arbalest 09-23H, and one active territory near the Crossbow 20-06H well. This proposed 20-06H well pad location is adjacent to an existing coal bed natural gas well with an existing access road and existing overhead power. There are no other ferruginous hawk nest records within 0.5 mile of the other well locations in the BLM database. During surveys conducted by SWCA in May and June 2010, most previously recorded nests now appear to be abandoned and not recently active. A personal communication with the landowner suggests that ferruginous hawks in the project vicinity have not been active in the area in recent years since the installation of CBM wells nearby. However, some new or previously unrecorded ferruginous hawk ground nests were identified during preliminary surveys in September 2009 by SWCA and were reevaluated for nest activity during

the May and June 2010 raptor surveys. One active ferruginous hawk nest and two previously unrecorded inactive ferruginous hawk nests were discovered near the proposed Crossbow 20-06H well. Where access was permitted all other ferruginous hawk and raptor nest records within 0.5-mile of the proposed project facilities were checked during surveys and all were determined to be inactive for the 2010 nesting season.

Table 7. Ferruginous hawk nests within 0.5 mile of proposed wells

<b>BLM Nest ID</b>	<b>Year Recorded</b>	<b>Active/ Inactive</b>	<b>Closest Well</b>	<b>Distance (miles)</b>	<b>Direction from Well</b>
2507	2004	Inactive	Arbalest 09-23H	0.43	S
2518	2004	Inactive	Arbalest 09-23H	0.50	E
2519	2004	Inactive	Arbalest 09-23H	0.50	E
5179	2008	Inactive	Arbalest 09-23H	0.32	N
FH41N72W2602	2010	Inactive	Arbalest 09-23H	0.18	S
2501	2004	Inactive	Bolt 1-35H	0.37	NW
2502	2004	Inactive	Bolt 1-35H	0.33	W
5178	2007	Inactive	Bolt 1-35H	0.27	SW
5182	2007	Inactive	Bolt 1-35H	0.28	W
5183	2007	Inactive	Bolt 1-35H	0.46	S
FH41N71W0601	2010	Inactive	Crossbow 20-06H	0.25	S
FH41N71W0602	2010	Inactive	Crossbow 20-06H	0.33	S
FH41N71W0603	2010	Active	Crossbow 20-06H	0.24	S

### 3.4. Cultural or Historic Values

Cultural resources inventories have been completed for the project area for compliance with Section 106 of the National Historic Preservation Act (NHPA) and meeting NEPA requirements. The well facilities proposed to access federal minerals—, Bolt 01-35H, Crossbow 07-06H, Crossbow 13-07H, Crossbow 20-06H, and Crossbow 27-29H well pad locations and access routes—fully received Class III inventories (Ferguson 2001, Ferguson and Meyer 2005, Greer and Greer 1999, Halligan and Rom 2004, and LaBelle 2004). The Arbalest 09-23H well was mostly inventoried in 2004 (Light 2004), but received additional inventory in 2010 (Wolfe 2010a). The Arbalest 01-02H well pad and access route location was partially reviewed during previous Class III inventory in the vicinity (Hatcher 2001), and the remainder received inventory in 2010 (Wolfe 2010b).

Cultural resources were found during field inventories in the vicinity of five of the well pads and access roads (Table 8). One of the cultural resource sites identified (at Bolt 01-35H) is considered eligible for National Register of Historic Places (NRHP) nomination and, therefore is to be treated as a historic property pursuant to 36 CFR 800, requiring mitigation for project impacts if within the area of potential effect for the project. The remaining cultural resource sites and other miscellaneous cultural materials in the project area are not eligible for NRHP nomination, and require no further work or mitigation pursuant to 36 CFR 800. Two of the well locations, Arbalest 01-02H and Crossbow 13-07H, included no cultural resource sites within their immediate vicinity.

Table 8. Summary of Cultural Resource Sites Identified in the Project Vicinity

Well Pad Name	Site Number	Site Type	NRHP Eligibility
Arbalest 09-23H	48CA4779	Prehistoric lithic scatter	Not Eligible
Bolt 01-35H	48CA3315; 48CA3316	Historic homestead ruins; Prehistoric bison kill/trap	Not Eligible; Eligible
Crossbow 07-06H	48CA5016; 48CA5025	Prehistoric open camp; Prehistoric lithic scatter	Not Eligible; Not Eligible
Crossbow 20-06H	48CA5018	Historic debris / prehistoric lithic scatter	Not Eligible
Crossbow 27-29H	39CA3925	Historic debris	Not Eligible

### 3.5. Air Quality

Existing air quality throughout most of the Powder River Basin is in attainment with all ambient air quality standards. Although specific air quality monitoring is not conducted throughout most of the Powder River Basin, air quality conditions in rural areas are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations.

Existing air pollutant emission sources within the region include following:

- Exhaust emissions (primarily CO and nitrogen oxides [NO<sub>x</sub>]) 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;
- Dust (particulate matter) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas and road sanding during the winter months;
- Transport of air pollutants from emission sources located outside the region;
- Dust (particulate matter) from coal mines;
- NO<sub>x</sub>, particulate matter, and other emissions from diesel trains and,
- SO<sub>2</sub> and NO<sub>x</sub> from power plants.

For a complete description of the existing air quality conditions in the Powder River Basin, please refer to the PRB Final EIS Volume 1, Chapter 3, pages 3-291 through 3-299.

### 3.6. Surface Water

Surface water resources in the project area consist of small agricultural impoundments and reservoirs within slight isolated depressions or gullies with associated ephemeral streams. Crossbow 20-06H, Crossbow 07-06H, and Crossbow 13-07 well pads and their associated roads are within the Antelope Creek-Horse Creek watershed (hydrologic unit code [HUC] 101201010301) (Figure 4). The other wells and access roads are within the Spring Creek-Antelope Creek watershed (HUC 101201010302). Major named surface water features in the project area and vicinity include Spring, Antelope, and Porcupine creeks which flow southwest and eventually drain into the Cheyenne River approximately 20 miles east-southeast of the project area.

### 3.7. Wetlands and Riparian

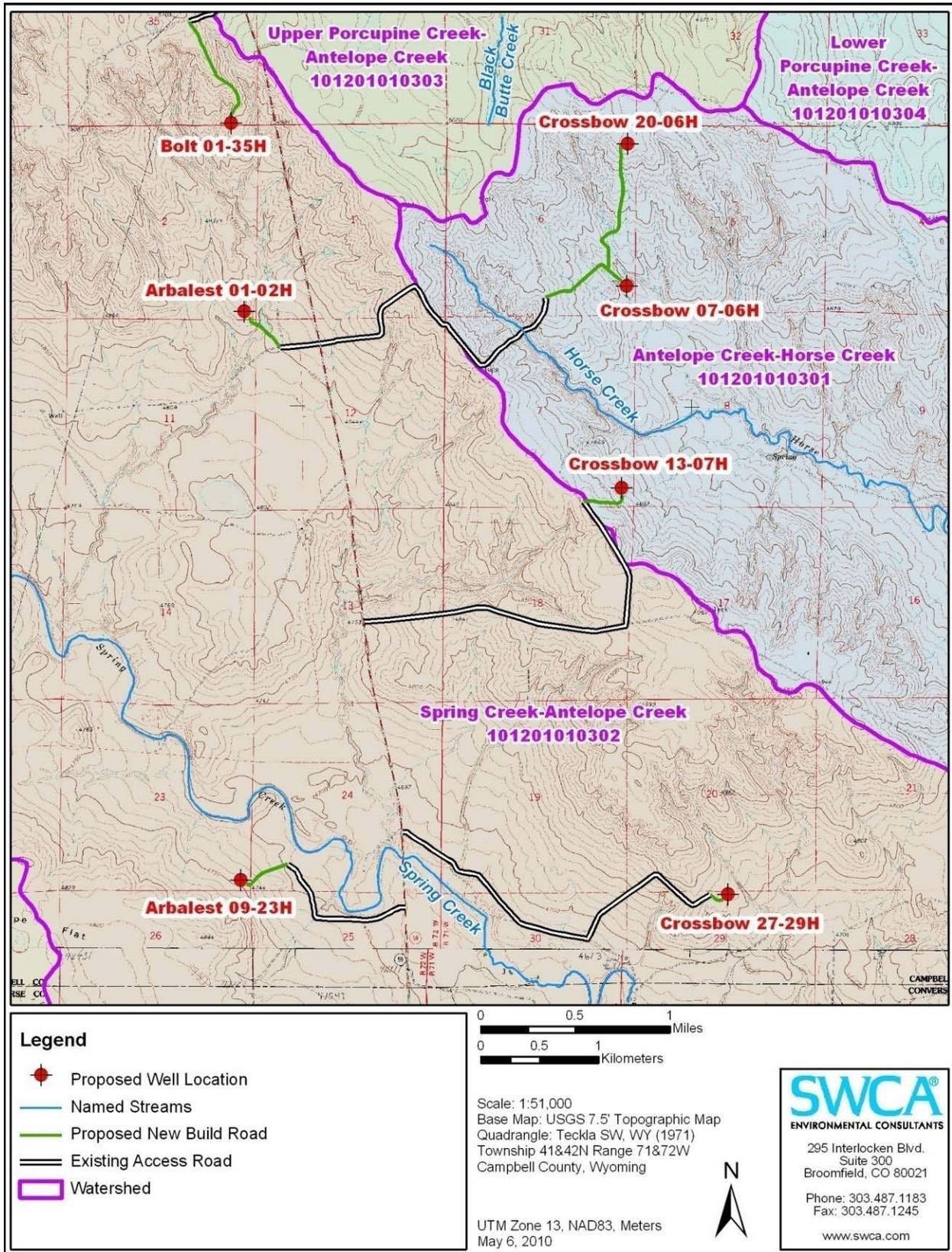
Wetlands in the proposed project area are predominantly affiliated with the seasonally wet and dry ephemeral streams and slight depressions in the area. Based on the National Wetland Inventory (NWI) database, three potential isolated wetlands occur within 0.5 mile of the project area. Some of these areas, including Horse Creek and several unnamed tributaries to Spring Creek and Horse Creek will be crossed by access roads for the proposed project. These drainages will be crossed at existing low-water road

crossings and no new significant impacts to surface water features or wetlands are anticipated from the proposed activities.

Wetland and riparian habitats are associated with the named ephemeral streams in the area such as Horse and Spring creeks. It can be expected that a narrow riparian corridor and associated wetlands in the bottoms of the active channels are associated with these ephemeral streams at some points along the channel. Unnamed tributaries are expected to exhibit even less riparian and wetland characteristics depending on catchment size, drainage gradients, and substrate composition. The hydrology of these ephemeral drainages is relatively localized by catchment with influx limited to localized precipitation events and snow melt during the spring months.

Wetland soils within the isolated depressions near the project area are primarily characterized as poorly to somewhat well-drained and comprised of a fine sandy skeletal mix or a fine sandy clay loam within a fine granular structure. Wetland soils in these small depressions are generally smaller units of the Forkwood-Ulm and Hiland-Bowbac soil series.

Figure 4. Watersheds and named surface water features in the project.



### **3.8. Groundwater**

Groundwater in the project area originates from regional and localized aquifers. Typical groundwater depth for the localized aquifer in the area is approximately 59 feet below the surface (SDVC 2009). Based on information from the Wyoming State Engineers Office for permitted wells, 243 water wells are located within 1 mile of the proposed wells (State of Wyoming 2010). Of these well bores, 165 are associated with coalbed methane (CBM) development. The CBM wells have an average static depth ranging from 331 to 865 feet from the surface. Twenty-four of the well bores are monitoring wells and two are domestic wells. The domestic wells are both 179 feet deep. The Wyoming State Engineers Office designates the remaining wells as storage.

## **4. ENVIRONMENTAL CONSEQUENCES**

The environmental consequences of the proposed action for each resource are described below. Mitigation measures designed to minimize impacts are listed for the resource when applicable.

### **4.1. Alternative A**

### **4.2. Discussion on Alternative A can be found in the PRB FEIS.**

### **4.3. Alternative B**

#### **4.3.1. Vegetation and Soils**

##### **4.3.1.1. Direct and Indirect Impacts**

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

Impacts to soil resources within the proposed project area are directly related to the amount of surface disturbances resulting from the proposed action. Direct soil impacts include soil horizon disturbances to the O, A1, and A2 horizons resulting from site clearing, cut and fills, and location and access road grading. Secondary impacts to soils include loss of soils to wind, rain, and other erosive forces following horizon disturbances. Some soil erosion is expected to occur due to exposed soils on the proposed well pads and access roads required for construction. For well pad and access road construction, a minimum of 4 inches of topsoil would be stripped from the O and upper A1 horizons within each respective footprint and temporarily stored along the sides of the road or per well pad layout to provide access to the subsoil, which is better suited for shaping and compaction. 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, 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. 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 within six months if no drilling takes place. Once production ceases, final reclamation would begin by re-grading the pad to the original contours and redistributing topsoil. The entire disturbed area, including the former access roads and well pad, would be reseeded with the seed mixture specified in the COAs. The proponent would implement BMPs listed earlier related to the reclamation effort and conduct all surface activities, including reclamation activities, in accordance with the BLM Gold Book (BLM and USFS 2007).

#### **4.3.1.2. Mitigation**

- 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.
- All areas not needed for production will be reclaimed in order to increase interim reclamation potential and soil stability (See the attached Production Facility Layouts in the Project Plans 785 for details).
- The operator will seed all areas not needed for production with a BLM specific mix or a seed mix provided by the surface owner in lieu of the BLM seed mix.
- 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.

#### **4.3.2. Invasive, Non-native Species**

##### **4.3.2.1. Direct and Indirect Impacts**

Surface disturbances associated with the implementation and construction of the proposed well sites and access roads would present opportunities for weed invasion and spread. Direct impacts to native vegetation from weed infestations in the project area may include the loss of wildlife habitat, rangeland productivity, and reduced native plant species diversity. Indirect impacts resulting from weed infestations could be changes in the fire cycle due to the potential for cheatgrass proliferation on disturbed soils and increased costs from weed management efforts. 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.

#### **4.3.3. Wildlife**

##### **4.3.3.1. Direct and Indirect Impacts**

Construction activities and surface disturbance would occur in mule deer and pronghorn year-long range. These disturbances would be short-term due to the establishment of native vegetation associated with reclamation activities. Mule deer and pronghorn may be temporarily displaced during construction activities, but likely would return following construction. A fence constructed around the perimeter of reserve pits would keep wildlife, including big game, from accessing the pits. Temporary displacement may continue in response to periodic human activities associated with operations and maintenance.

Ground clearing would impact habitat for wildlife species, including small birds and small mammals. Proposed project activities may affect raptor and migratory bird species through direct mortality, habitat degradation, and/or displacement of individual birds. Oil present in reserve pit fluids can entrap and kill migratory birds (USFWS 2009). Potential impacts to migratory birds and raptors would be limited by fencing and netting of the reserve pits and closing the pits as soon as possible following drilling activities. In general, reserve pits will be closed within 6 months of drilling completion unless a second well is planned or a variance is approved by the BLM. Any impacts to birds in the project area are regulated in part through the Migratory Bird Treaty Act of 1918 (916 United States Code 703–711).

Raptors and migratory birds would also experience some habitat loss; however, impacts would be reduced by reclamation efforts. Impacts would be relatively short-term where effective reclamation is successful in re-establishing native grasses, forbs, and brush species in a relatively short period of time. Human activities may temporarily displace birds occupying areas in close proximity to the well sites and access roads. If these activities are close to raptor nests, nest productivity could be impacted. This would be avoided through nesting timing stipulations and biologic buffers.

#### **4.3.3.2. Mitigation**

- The project area and 0.5-mile buffer would be surveyed for raptor nest activity by a biologist prior to construction activities between April 15 and June 15. Surface disturbance activities would be restricted within 0.5 mile of an occupied raptor nest between February 1 and July 31.

#### **4.3.4. Threatened, Endangered, and Sensitive Species**

##### **4.3.4.1. Direct and Indirect Impacts**

No federally listed species are known to occur in the project area or vicinity and no impacts would be expected. Sage-grouse may be temporarily deterred from using the project area during construction due to human activity.

All wells and access roads have been located away from known raptor nests to the extent possible to avoid impacts from human activities and infrastructure. Indirect impacts to ferruginous hawk may include disturbance from human activities during construction and maintenance activities during the nesting season. No direct impacts would be expected as active nests would be avoided through nesting timing stipulations and biologic buffers. The nesting territory south of the Crossbow 20-06H wells has a high probability of being negatively impacted by operations and maintenance of the 20-06H wells. This pair may choose to relocate, discontinue breeding, or continue to nest. The presence of a producing coal bed natural gas well, in the same location as the proposed wells, did not prevent the pair from nesting in 2010. There is a strong potential for abandonment of this breeding territory as a result of the proposed action.

Swift fox are generally nocturnal and their periods of activity are not expected to overlap with construction and maintenance activities. However, if present, fox dens could be impacted by construction activities and should be identified and avoided. No denning sites are currently documented for the project area and surveys in June 2010 did not confirm any active dens in the vicinity of Arbalest 9-23H.

Nesting mountain plovers are potentially present within the project vicinity but most well pads and access roads lack suitable nesting habitat due to vegetation or slope characteristics. However, suitable habitat may exist for nesting mountain plovers at the proposed Arbalest 9-23H well pad and access road, and pre-construction surveys for nesting mountain plovers were conducted by SWCA during May and June 2010. No mountain plovers were observed in the vicinity of the proposed Arbalest 9-23H. If undocumented plovers exist in the project vicinity, direct impacts may involve mortality of adult and young from vehicle collisions if access roads are located near plover nesting areas. Indirect impacts may include increased predation pressure if structures are located within 0.5 mile of nesting areas, disturbance from human activities during the nesting season, and loss of suitable nesting habitat.

##### **4.3.4.2. Mitigation**

- The project area and 0.5-mile buffer would be surveyed for ferruginous hawk nest activity by a biologist prior to construction activities between April 15 and June 15. Surface disturbance activities would be restricted within 0.5 mile of an occupied ferruginous hawk nest between February 1 and July 31.

#### **4.3.5. Cultural or Historic Values**

##### **4.3.5.1. Direct and Indirect Impacts**

Construction activities and surface disturbance may affect cultural resources in the project area. The proposed access road for well pad Arbalest 09-23H would impact site 48CA4779. However, it is considered not eligible to the NRHP.

The proposed well pad Bolt 01-35H and access road would not impact 48CA3315 and 48CA3316. These sites are outside of the area of potential effect for the project.

The proposed well pad Crossbow 07-06H could impinge upon sites 48CA5016 and 48CA5025. However, these sites are not eligible for nomination to the NRHP; therefore, they are not considered to be historic properties that could be affected by the project. These sites are not immediately within the area proposed for well development, but rather simply in close proximity to planned ground disturbance. No historic properties will be impacted with development of the Crossbow 07-06H facilities.

The proposed well pad Crossbow 20-06H access road will destroy portions of 48CA5018. 48CA5018 is not eligible for nomination to the NRHP; therefore, it is not considered to be a historic property that could be affected by the project and no further work or mitigation is required. Without substantial deposition capable of supporting the potential for significant subsurface archaeological discoveries, no active archaeological monitoring is recommended during development. No historic properties will be impacted with development of the Crossbow 20-06H facilities.

The proposed well pad Crossbow 27-29H will not impact 48CA3925. This site is outside of the area of potential effect for the project.

Isolated resources, by definition, are not eligible to the NRHP. Therefore no avoidance or impact mitigation is required at these locations.

#### **4.3.6. Air Quality**

##### **4.3.6.1. Direct and Indirect Impacts**

Air emissions would result from construction, drilling, and completion activities, and production. Construction emissions would occur from earth-moving equipment, vehicle traffic, and fugitive dust. Drilling rig, workover rig, and vehicle engine exhaust would result in additional emissions. Well production equipment could result in fugitive emissions as well. The amount of air pollutant emissions would be controlled by watering disturbed soils and by air pollutant emission controls imposed by the Wyoming DEQ – Air Quality Division. Air quality impacts modeled in the PRB FEIS concluded that projected oil and gas development would not violate any local, state, tribal, or national air quality standards. This project would not contribute to any exceedences of air quality standards.

#### **4.3.7. Surface Water**

##### **4.3.7.1. Direct and Indirect Impacts**

Removal of vegetation can lead to increased erosion and sedimentation of surface water. Runoff from the proposed well areas would flow to Spring, Antelope, Horse, and Porcupine Creeks. However, the well pads and roads would be engineered and constructed to minimize the suspended solid concentration of surface runoff, avoid disruption of drainages, and avoid direct impacts to surface water. Topography, natural drainage, and erosion control were considered during planning for each proposed location. No surface water would be used for well drilling operations. Produced water would be temporarily stored in reserve pits or in tanks on the well pad, as described in the proposed action. Berms would be constructed around all production facilities on well pads to contain fluids, if spilled. Any chemicals or potentially hazardous materials would be handled in accordance with the EOG's Spill Prevention, Control and Countermeasure Plan (SPCCP). Provisions established under the SPCCP would minimize or eliminate potential impacts to any surface waters associated with an accidental spill.

#### **4.3.8. Wetlands and Riparian**

##### **4.3.8.1. Direct and Indirect Impacts**

Some minor direct impacts to wetlands or riparian habitats would occur from the construction of the access roads in the project area. These direct impacts would occur at the low-water crossing of Horse Creek where upgrades to the existing road would likely be needed and along road improvements of existing two-tracks in unnamed tributaries to Horse Creek and Spring Creek near the Arbalest 01-02H, Crossbow 07-06H, and Crossbow 20-06H. Additionally, the Arbalest 01-02H well pad location is located

approximately 200 feet west of an unnamed ephemeral tributary to Spring Creek and associated stock pond feature. The access road for Arbalest 01-02H will use an existing earthen dam for the stock pond, and the siting of the well pad will avoid impact to this drainage with a setback of at least 20 feet from the toe of disturbance. BMPs, including straw wattles or other erosion control structures, would be placed and maintained around this location and access road to avoid inadvertent impact during construction and drilling operations.

Two small unnamed ephemeral drainages with potential wetland habitat are located immediately adjacent to the Crossbow 07-06H well pad location. The siting of the well pad is such as to avoid and not encroach into this feature and BMPs, including straw wattles or other erosion control structures, would be placed around this location to avoid inadvertent impact during construction and drilling operations.

Wetlands impacts in the vicinity of these crossings will be minimal as defined wetland features are not present in most channels in the project area or at the proposed crossing locations. Any fill of potentially jurisdictional waters of the U.S. would be coordinated and permitted where appropriate with the US Army Corps of Engineers (USACE).

Indirect impacts to wetlands and riparian areas would occur if erosion and sedimentation occurred, causing deposition in these down-gradient areas. Due to the avoidance of these types of habitats and operator-committed measures for stormwater management, secondary impacts to the resources would not be expected. Further measures, including installation of straw wattles near drainage features and along access roads, maintaining a setback of 20 feet from the top of bank of all drainage features for well pad corners, and interim site reclamation, would further minimize the potential for any secondary impacts to these surface water features.

#### **4.3.9. Groundwater**

##### **4.3.9.1. Direct and Indirect Impacts**

Water for drilling, completion, and dust control would be obtained from an approved and permitted off-site water haul site. Two additional water supply wells may be drilled on private land in the area. Each well would require approximately 20,000 to 30,000 barrels of water would be needed to perform drilling operations; however, water use for drilling may be reduced by the reuse of some or most of the drilling fluids in subsequent drilling operations. Approximately 40,000 to 80,000 barrels of water would be required to complete the horizontal wells, depending on the number of stimulations required on an individual well.

Due to 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 occurs during well operations and production.

##### **4.3.10. Cumulative Effects**

Although the proposed action would not have significant impacts, environmental impacts may accumulate either over time or in combination with similar events in the area. Unrelated and dissimilar activities may also have negative impacts on critical elements, thereby contributing to the cumulative degradation of the environment.

Reasonably foreseeable future impacts must also be considered. Past and current disturbances in the vicinity of the project area include farming, grazing, roads, and other oil and gas wells. Should development of the wells included in this EA prove productive, it is likely that EOG and possibly other operators would pursue additional development in the area.

In conjunction with the development presented in this EA, EOG also plans to develop two additional multi-well pads on fee surface and fee minerals (Arbalest 05-13H and Arbalest 11-24H). The locations and wells associated with these pads are listed in Table 9. The impacts for these well pads were not analyzed in this EA and will contribute to the cumulative impacts of the project from surface disturbance and air quality during drilling

EOG also plans to co-locate two additional wells with fee mineral leases (Arbalest 03-02H and Arbalest 04-02H) on the proposed federal well pad Arbalest 01-02H. These wells were co-located with federal lease wells to minimize surface disturbance. Well pads may subsequently be expanded by 32 feet on one side to accommodate each two additional wells. The life of each productive well is anticipated to be up to 40 years. There will be some minimal additional air quality impacts from development of these wells during the drilling phase of the project.

Table 9. EOG Proposed Fee Well Pad Names/Locations/Wells in the Project Vicinity

Well Pad Name	Township	Range	QTR Section	Wells
Arbalest 05-13H	41N	72W	NWNW Sec 13	Arbalest 05-13H, 06-13H, 07-13H, 08-13H
Arbalest 11-24H	41N	72W	NWNW Sec 24	Arbalest 11-24H, 12-24H

The most significant foreseeable activity with potential to impact critical elements of the human environment is oil field development. This project is part of the PRB oil and gas project; the cumulative impacts of oil and gas production in the vicinity are discussed in the PRB FEIS (BLM 2003). Current ranching is expected to continue with little change.

#### 5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at On-site?
Jennifer Yu	Senior Regulatory Assistant	EOG Resources, Inc.	Yes
Heather Smith	NEPA Coordinator	EOG Resources, Inc.	No
Lee Isenberger	Surface Owner	Isenberger Land, LLC.	Yes

#### 6. OTHER PERMITS REQUIRED

A number of other permits are required from Wyoming State and other Federal agencies. These permits are identified in Table A-1 in the PRB FEIS Record of Decision.

#### 7. REFERENCES AND AUTHORITIES

##### Authorities

The National Environmental Policy Act of 1969 (NEPA), as amended (Public Law 91—90, 42 USC 4321 et seq.)

##### Code of Federal Regulations (CFR)

- 40 CFR All Parts and Sections inclusive Protection of Environment. Revised as of July 1, 2001.
- 43 CFR All Parts and Sections inclusive – Public Lands: Interior. Revised as of October 1, 2000.

The Federal Land Policy and Management Act, as amended. Public Law 94-579. U.S. Department of the Interior, Bureau of Land Management, and Office of the Solicitor (editors). 2001.

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