

**DECISION RECORD**  
**Samson Resources Company, Crazy Woman Exploratory Plan of Development (POD)**  
**Environmental Assessment (EA), WY-070-EA15-85**  
**Bureau of Land Management, Buffalo Field Office, Wyoming**

**DECISION.** The BLM approves Samson Resources Company (SRC) Crazy Woman Exploratory oil and gas well applications for permit to drill (APDs) and plan of development (POD), as described in Alternative B of the environmental assessment (EA), WY-070-EA15-85.

**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).
- Powder River Basin Oil and Gas Project Final Environmental Impact Statement (FEIS), (2003).
- Buffalo Resource Management Plan (RMP) 1985 and Amendments. 2001, 2003, 2011
- Greater Sage-Grouse Habitat Management Policy on Wyoming BLM Administered Public Lands (WY-IM-2012-019) and Greater Sage-Grouse Interim Management Policies and Procedures (WO-IM-2012-043).

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

**Wells List.** BLM approves 8 APDs and support facilities.

#	Pad Name	Well	Surface Hole Location				Surface Hole Lease
			Qtr	Sec	Twtn	Rng	
1	San Francisco	BLM Rice Federal 41-1423 48-79BH	Lot 16	23	48N	79W	Fed
		BLM Niner Federal 44-3526 48-79BH					
2	San Diego	BLM Seau Federal 11-1423 48-79BH	Lot 14	23	48N	79W	Fed
		BLM Charger Federal 14-3526 48-79BH					
3	St. Louis East	CR Ram Federal 41-1522 48-79BH	Lot 15	22	48N	79W	Fed
		CR Cardinal Federal 44-3427 48-79BH					
4	St. Louis West	CR Dickerson Federal 11-1522 48-79BH	Lot 14	22	48N	79W	Fed
		CR Musial Federal 14-3427 48-79BH					

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

**THE FINDING OF NO SIGNIFICANT IMPACT (FONSI).** Analysis of Alternative B of the EA, WY-070-EA15-85, and the FONSI (incorporated here by reference) found SRC's proposal for North Tree Phase 1 POD will have no significant impacts on the human environment, beyond those described in the PRB FEIS. There is no requirement for an EIS.

**COMMENT OR NEW INFORMATION SUMMARY.** BLM publically posted the APD for 30 days, received no comments, and then internally scoped them. Since receipt of this APD 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 SRC included design features and mitigation measures (conditions of approval (COAs)) to

reduce environmental impacts while meeting the BLM's need. For a complete description of all site-specific COAs, see the COAs.

- The impact of this development cumulatively contributes to the potential for local extirpation of the Greater Sage Grouse (GSG) yet its effect is acceptable because it is outside priority habitats and is within the parameters of the PRB FEIS/ROD and current BLM (WO-IM-2012-043) and Wyoming (WY-IM-2012-019) GSG conservation strategies.
  - With application of Standard Operating Procedures (SOPs), applied mitigation, Required Design Features, and COAs identified for Greater Sage-Grouse under the proposed action, impacts caused by surface-disturbing and disruptive activities would be minimized.
  - There are no conflicts anticipated or demonstrated with current uses in the area.
2. The Resource Management Plan (RMP) for the Buffalo Field Office is currently undergoing revision. The Draft RMP and Environmental Impact Statement was released in June 2013. The proposed action was screened against the Draft RMP to ensure that the proposed action would not preclude BLM's ability to select any alternative in a ROD. The proposed action was also determined to not be inconsistent with the direction outlined in the RMP's Preferred Alternative.
  3. SRC will conduct operations to minimize adverse effects to surface and subsurface resources, prevent unnecessary surface disturbance, and conform to currently available technology and practice.
  4. SCR committed to:
    - Comply with the approved APD, applicable laws, regulations, orders, and notices to lessees.
    - Obtain necessary permits from agencies.
    - Incorporate several measures to alleviate resource impacts into their submitted surface use plan and drilling plan.
  5. SCR certified it has a surface access agreement.
  6. The selected alternative will help meet the nation's energy needs, and help stimulate local economies by maintaining workforce stability.
  7. The project is clearly lacking in wilderness characteristics as the project area is an active oil and gas field.
  8. These APDs are pursuant to the Mineral Leasing Act for the purpose of exploring or developing oil or gas and do not satisfy the categorical exclusion directive of the Energy Policy Act of 2005, Section 390 because the proposed wells are not in a developed field supported by a NEPA document.

**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: \_\_\_\_\_ /s/ Duane W. Spencer

Date: \_\_\_\_\_ 3/25/15



**ENVIRONMENTAL ASSESSMENT (EA), WY-070-EA15-85**  
**Samson Resource Company, Crazy Woman Exploratory, Plan of Development**  
**Bureau of Land Management, Buffalo Field Office, Wyoming**

**1. INTRODUCTION**

BLM provides this environmental assessment (EA) for Samson Resource Company (SRC) Crazy Woman (CW) Exploratory Plan of Development (POD) with eight oil and gas applications for permit to drill (APDs) from four well pads. This site-specific National Environmental Policy Act (NEPA) analysis tiers to and incorporates by reference the information and analysis in the Powder River Basin Oil and Gas Project Final Environmental Impact Statement and Proposed Plan Amendment (PRB FEIS), WY-070-02-065, 2003 and the PRB FEIS Record of Decision (ROD) pursuant to 40 CFR 1508.28 and 1502.21. The PRB FEIS and ROD are available for review at the BLM Buffalo Field Office (BFO) and at: [http://www.blm.gov/wy/st/en/field\\_offices/Bufallo.html](http://www.blm.gov/wy/st/en/field_offices/Bufallo.html).

**1.1. Background**

Surface and fluid mineral ownership in the project area is a combination of fee, state, and federal estate. The pad locations are located on federal surface, associated infrastructure (access roads, surface lines are on fee and federal surface. SRC proposes to develop fluid mineral leases efficiently by centralizing drilling locations so multiple wells can be drilled from each well pad. There are four well pads proposed, three pads are designed to accommodate up to six wells, one is designed to accommodate four wells. The current CW Exploratory POD includes a total of eight wells. Pad and well surface hole locations, including bottom hole distance and direction, are provided in Table 1.1.

**Table 1.1. CW Exploratory POD Pad Location and Proposed Direction and Distance of Bottom Hole Location as related to the Surface Hole Location**

#	Pad Name	Well	Surface Hole Location				Bottom Hole Location <sup>1</sup>	
			Qtr	Sec	TwN	Rng	Direction	Distance (ft)
1	San Francisco	BLM Rice Federal 41-1423 48-79BH	Lot 16	23	48N	79W	N04°52'00"W	10,197.75
		BLM Niner Federal 44-3526 48-79BH					S02°26'23"W	10,759.29
2	San Diego	BLM Seau Federal 11-1423 48-79BH	Lot 14	23	48N	79W	N02°30'34"W	9,939.35
		BLM Charger Federal 14-3526 48-79BH					S00°06'44"W	10,945.64
3	St. Louis East	CR Ram Federal 41-1522 48-79BH	Lot 15	22	48N	79W	N00°36'02"W	10,213.65
		CR Cardinal Federal 44-3427 48-79BH					S01°36'32"W	10,676.66
4	St. Louis West	CR Dickerson Federal 11-1522 48-79BH	Lot 14	22	48N	79W	N05°15'38"W	10,234.66
		CR Musial Federal 14-3427 48-79BH					S02°58'04"W	10,760.51

<sup>1</sup> Bottom hole location indicated from surface hole location

Of these eight wells, four will produce federal minerals only, with the remaining four wells producing both federal and fee minerals. SRC submitted to the BLM notices of staking (NOSs) and APDs related to the federal portion of the CW Exploratory POD. A timetable of actions for this project provides context for the need statement:

- SRC and the BLM held a planning meeting for the project on August 21, 2014.
- SRC submitted NOSs for the CW Exploratory POD to the BLM on September 22, 2014.
- SRC and BLM conducted an onsite reconnaissance of the CW Exploratory POD area on October 8, 2014 to discuss the primary access roads and conducted onsite reconnaissance of the San Francisco, San Diego, St. Louis East, and St. Louis West well pads on October 21, 2014. Attendees included BLM, SRC, Anadarko Petroleum Corporation, WWC Engineering, and landowners representing the Camino Ranch Limited Partnership.
- SRC submitted APDs for eight wells to be drilled from four well pads on December 2, 2014. The APDs included the surface access agreement self-certifications, drilling plans, and Master Surface Use Plan of Operations (MSUP) for these proposed wells.
- BLM sent SRC deficiencies on December 24, 2014.
- BLM received deficiencies February 4, 2014.

**1.2. Need for the Proposed Project**

The need for this project is to determine whether, how, and under what conditions to support the Buffalo Resource Management Plan’s (RMP) goals, objectives, and management actions (BLM 2003) by allowing the exercise of SCR’s conditional lease rights to develop fluid minerals on federal leases. As supported by CFR 1502.21, BLM incorporates APD information here by reference as an integral part of this EA (SCR 2014). The APDs and administrative record (AR) are available for public review at the BFO. The conditional fluid mineral development proposed herein 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**

Using information provided in this EA and all other available pertinent information, the BLM will decide whether or not to allow the proposed development and, if so, under what terms and conditions agreeing with the BLM’s multiple use mandate, environmental protection, and RMP.

**1.4. Scoping and Issues**

The BLM posted the APDs for 30-days and received no public comments. The BLM interdisciplinary (ID) team conducted internal scoping by reviewing the proposed development and project location to identify potentially affected resources and land uses. This EA addresses those site-specific impacts that were unknown at the time of the PRB FEIS analysis that would help in making a reasoned decision or may be related to a potentially significant effect. The following resources/land uses are not present in the project area and will not be further analyzed:

Floodplains	Environmental Justice	Areas of Critical Environmental Concern
Wilderness Values	Prime or Unique Farmlands	Native American Religious Concerns
Wild and Scenic Rivers		

**2. ALTERNATIVES**

**2.1. Alternative A – No Action Alternative**

The No Action Alternative would deny these APDs. 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 subsequent NEPA analyses for adjacent and intermingled developments to the proposal area (Table 2.1).

**Table 2.1. Overlapping NEPA Analyses which BLM Incorporates by Reference as Similar Drilling Analyses or Surface Analyses in the Semi-Arid Sagebrush, Short Grass Prairie to this Proposal**

POD Name	NEPA Document	Well Type and #	Mo/Yr
APC Mufasa Fed 11-31H	WY-070-EA12-062	1/Oil	4/2012
APC Simba Fed 22-44H	WY-070-EA12-61	1/Oil	3/2013
SRC Samson North Tree	WY-070-EA13-77	18/Oil	3/2013
APC Crazy Cat East	WY-070-EA13-028	36 +/- on 24 +/-	3/2013
Camino	-EA06-044	26/CBNG	8/2006
	-CX-070-10-399; -CX06-1-	road, road	10/2010, 11/2006
Cat Creek Cat Creek Add 1 Cat Creek Add 1 Amend	-EA04-083	63/CBNG	9/2004, 11/2012
	-EA05-026 & -247	relocate utilities	11/2004, 7/2005
	-EA05-354; -CX09-1-004	4/CBNG	9/2005, 10/2008
	-CX07-06-3-006	1/CBNG	6/2006
Coulter 1	EA05-027	15/CBNG	3/2005
	-CX08-1-16; CX07-4-003	utilities, utilities	11/2008, 12/2006
Coulter 3	-EA06-154	34/CBNG	3 & 7/2006
Coulter 4	-EA08-169	20/CBNG	9/2008
	-CX09-1-037	utility	2/2009
Crude Cat	-EA06-215	9/CBNG	8 & 8/2006
Iberlin	-EA06-060	37/CBNG	3/2006
	-CX07-4-003	water	5/2012
Welles	-EA07-04-173	14/CBNG	5/2004, 12/2012

## 2.2. Alternative B - Proposed Action (Proposal)

**Overview:** SRC proposes to explore for and develop oil and conventional natural gas reserves underlying oil and gas leases it possesses in east-central Johnson County, Wyoming via the CW Exploratory POD project. The surface owners within the project area are the BLM, Camino Ranch Limited Partnership, HIP Investments, LLC, and CBM Properties, LLC. SRC initially proposes to drill, produce, and eventually reclaim eight well bores targeting the Sussex Formation from four well pads. All eight of the proposed wells are on pads on federal surface with four of the proposed wells targeting federal minerals only and four wells producing both federal and fee minerals. All eight wells will be completed utilizing directional drilling to recover fluid minerals. SRC proposes developing four double bore well pads (two wells per pad) but the actual number of wells on each well pad is dependent on economics, spacing rules, mineral estate, and geological reservoir factors. Associated infrastructure includes access roads to the well pads, gathering lines to transport gas from the well sites, a staging area, and a water storage facility. While the designs for the staging area and storage facility have not been formalized at this time, the general locations within the CW Exploratory POD project area have been selected and will be considered in the impacts assessment. SRC anticipates the life of each productive well would be approximately 40 years. SRC is currently evaluating the potential for developing additional oil and gas resources within and adjacent to the CW Exploratory POD area, depending on exploration drilling results at each location and economic feasibility at the time of development. While the specifics of this development phase are not known at this time, the area of development is known so the Exploratory and Development Phase areas will be combined into the CW Exploratory POD area for the affected environment analysis and, to the extent known, the environmental consequences analysis.

The CW Exploratory POD pad development consists of an estimated 43.7 acres of disturbance. An additional approximate 72.1 acres of disturbance occurs across the 24 mi<sup>2</sup> (15,360 acre) project area that

is associated with road improvements (46.3 acres) and with proposed staging and storage areas (25.8 acres). The CW Exploratory project area is approximately 23 miles southeast of Buffalo and approximately 6 miles south of Interstate 90.

*Refer to the CW Exploratory POD MSUP, Reclamation, and Drilling plans included with the APD for detailed descriptions of proposal design features and construction practices. Additional information is provided in the subject APDs for maps showing the proposed well locations and associated facilities.*

Key to BLM’s jurisdiction is the surface hole mineral ownership (SHMO), lateral mineral ownership (LMO), and bottom hole mineral ownership (BHMO). Surface hole, lateral, and bottom hole mineral ownership is provided in Table 2.2. SRC is in compliance with all state spacing rules.

**Table 2.2. Pad and Well List and Mineral Ownership**

#	Pad Name	Well	SHMO	LMO	BHMO
1	San Francisco	BLM Rice Federal 41-1423 48-79BH	WYW133220	WYW133220 Fee WYW13327 WYW137976	WYW137976
		BLM Niner Federal 44-3526 48-79BH	WYW133220	WYW133220 WYW137976	WYW137976
2	San Diego	BLM Seau Federal 11-1423 48-79BH	WYW133220	WYW133220 Fee WYW13327 WYW137976	WYW137976
		BLM Charger Federal 14-3526 48-79BH	WYW133220	WYW133220 WYW137976	WYW137976
3	St. Louis East	CR Cardinal Federal 44-3427 48-79BH	WYW133227	WYW133220 WYW137976	WYW137976
		CR Ram Federal 41-1522 48-79BH	WYW133227	WYW133327 WYW137976 Fee	WYW137976 Fee
4	St. Louis West	CR Dickerson Federal 11-1522 48-79BH	WYW178096	WYW137976 WYW178096 Fee	Fee
		CR Musial Federal 14-3427 48-79BH	WYW178096	WYW133220 WYW137976	WYW137976

**Construction Activities:** General construction activities for access roads and each proposed well pad would follow practices and procedures outlined in the CW Exploratory POD MSUP and reclamation drilling plans, in addition to the COAs in the PRB FEIS ROD, as well as changes made at the onsite.

**Access Roads**

- Access to the proposed wells will include the network of existing improved, proposed template (do not require engineered design), and engineered roads. SRC would use existing access routes where practical to minimize surface disturbance. Many of the existing improved routes in the CW area are associated with the ranching activities and the previous oil and gas development in the area.
- A detailed description of access for each well pad is in the CW MSUP and summarized in Table 2.3.

**Table 2.3. Proposed Road Disturbance Summary for the CW Exploratory POD**

Well Pad Name	Pad #	Existing Improved Road (mi)	Template Road (ft)	Template Road (Ac)	Engineered Road (Ac)
San Francisco	1	15.40 <sup>1</sup>	2,648	1.82	0.00
San Diego	2		350	0.24	0.00
St. Louis East	3		2,214	1.52	2.02 <sup>2</sup>
St. Louis West	4		166	0.11	2.02 <sup>2</sup>
<b>Total</b>	--	<b>15.40</b>	<b>5,378</b>	<b>3.69</b>	<b>2.02</b>

<sup>1</sup> Includes 7.8 miles of the Schoonover and Iberlin roads and 7.6 miles of existing unnamed improved access

<sup>2</sup> The St. Louis East and St. Louis West pads share 1,103 feet (2.02 acres) of engineered road

#### Well Pad Layout

- SRC proposes to develop well pads so that multiple wells may be drilled from each location to minimize surface impacts and reduce cost. As described here, the locations consist of two wells per pad but the pads are sized for a maximum of six wells. The actual number of wells and the order in which they are drilled will be determined by drilling results at each location and economic feasibility at the time of development. Well pad disturbance is provided in Table 2.4.

**Table 2.4. Proposed Pad Disturbance Summary**

Well Pad Name	Pad ID No.	Maximum # of Wells	Pad, Spoil and Topsoil Disturbance (Ac)	Interim Reclamation (Ac)	Long-term Disturbance (Ac)
San Francisco	1	2	8.59	4.09	4.50
San Diego	2	2	9.82	3.92	5.90
St. Louis East	3	2	8.56	3.50	5.06
St. Louis West	4	2	9.24	3.87	5.37
<b>Total</b>	--	<b>8</b>	<b>36.21</b>	<b>15.38</b>	<b>20.83</b>

#### Drilling Operations:

- SRC would drill each well with a rotary drilling rig. Up to three rigs could be operating at any particular time to achieve development objectives. Drilling operations, including mobilization, demobilization, and drilling to the target depth, would require approximately 30 days per well.
- Drilling operations require an average of 20 personnel and seven vehicles on location at any given time each day during the course of the 30-day drilling period. The average values account for higher traffic during periods of mobilization and demobilization. An additional 10 to 15 personnel and six vehicles would be required on location during the installation of production casing. Technicians and service personnel would commute to the project site daily.
- Wells will be drilled with semi-closed loop mud system. On average, SRC would use approximately 2,540 barrels (bbls) (42 gallons/bbl) of water to drill the initial 2,500 feet of hole on each well. Following installation of surface casing, a water based mud would be used to drill to the intermediate casing point, which would be through the Fox Hills Formation at approximately 7,600 feet, the Teapot Formation at approximately 8,150 feet, and the Parkman Formation at approximately 8,400 feet below ground surface. Setting intermediate casing to this depth will ensure protection of all formations having the potential to contain fresh water, (i.e., total dissolved solids less than 10,000 mg/L). Water use for the drilling and installation of the intermediate casing would be about 2,500 bbls. Drilling water would be obtained from either Anadarko's Fourmile West Facility located in Section 5, T47N, R78W, approximately 5 miles south of the project area or Crazy Woman Water LLC, approximately 11 miles south of Buffalo, Wyoming. If conditions allow, SRC may recycle any

water remaining in the fresh water mud system for using in drilling additional wells on a pad. Water used in the drilling would be stored at each well site in mud tanks.

- Completion activities will begin 45-60 days after drilling operations and are estimated to last approximately 30 days with an estimated 10 vehicle trips per day. SRC proposes to construct a fresh water pit (see engineered drawings for size) at each well pad for the water needed during hydraulic fracturing (HF) process where shallow groundwater is not present within 60 feet of the surface. SRC may also incorporate 170-foot diameter temporary storage tanks with an approximate capacity of 26,500 bbls. Based on recently drilled wells near the project area, SRC estimates completion will use 30,000-50,000 bbls of water per well. It is estimated that 25%-33% of completion water will initially return to the surface as flow back. The remaining water used for completion will likely return as produced water during operation of the well.
- SRC anticipates completing drilling and construction within 4 years. Drilling and construction is conducted on a year-round basis in the region. Weather may cause delays but delays rarely last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners may impose longer temporal restrictions.
- Refer to the CW Exploratory POD MSUP, Reclamation, and Drilling plans included with the APD for detailed descriptions of proposal design features and construction practices. Additional information is provided in the subject APDs for maps showing the proposed well locations and associated facilities.

#### **Oil Production Operations:**

- Typical oil production equipment required at the individual well locations includes: an artificial lift system (e.g., rod pump unit at the well head, typically powered by a gas engine, generator, or commercial electric power); combustion chambers; and line heaters
- Each well pad would have:
  - A tank battery for the storage of oil and produced water. Total oil storage capacity is anticipated to be 2,000 bbls per well. Total produced water storage capacity is anticipated to be 400 bbls per well. Therefore, for a six well pad configuration, storage capacity would typically be 12,000 bbls of oil and 2,400 bbls of water in up to 36 400-bbl tanks.
  - A heater/treater;
  - A flare stack/combustor
  - A connection point for loading tanker trucks used in hauling oil and water produced by each well;
  - Natural gas fired compressor, in the event that artificial gas lift is needed
  - A portable lease automatic custody transfer (LACT) or other BLM approved metering unit may be used if an electrical supply is available for the metering system); and
  - A metering house for each well for measuring the natural gas.
- New aboveground power lines would be constructed by a third party contractor. Changes to above-ground power lines due to landowner selection, load evaluation, and line capability or as a result of requests for power by other entities are not within the control of SRC.

The pumping units on the majority of the new wells would be powered by natural gas-engines utilizing gas produced by the wells. SRC anticipates the use of 115 hp Ajax gas engines, using the best available control technology (BACT) for stack emissions and noise control. These gas pump engines would be permitted and approved by Wyoming Department of Environmental Quality (WDEQ)/Air Quality Division (AQD ) under standard air permitting practices. Minimal maintenance is expected and the use of Ajax engines is expected to have minimal impact on average daily traffic. Temporary power may be provided utilizing natural gas powered generators if above-ground power lines are not completed before the wells begin production. The temporary power is expected to be in operation for no more than 24 months.

**Natural Gas Production:**

- Commercial quantities of natural gas may be expected from horizontal completions in the target formations. Meter houses to facilitate gas sales from each individual well bore would be installed at a centralized location at each pad. It is unknown at this time if Samson will install and maintain their gathering pipelines in this area or if infrastructure would be provided by third party entities. Gas will be piped to the Thunder Creek, Indian Creek facility located NENE of Section 32 T48N R78W. Any and all public and private Rights of Way will be obtained prior to construction.
- Some of the produced natural gas may be used to power equipment on the well location including the heater/treater and pumping unit. In situations where commercial quantities of gas are not encountered, small volumes of gas would be flared in accordance with Notice to Lessees 4A (USDI 1980).

**Produced Water Disposal (including flow back from completion processes):**

- Produced water including water from completion processes would be separated at the pad and temporarily stored in tanks at the well site prior to being transported by trucks to a permitted collection/disposal facility. Anticipated average water production is estimated to be 30 barrels (bbls) per day per well (annual production of 10,950 bbls per well). At peak, 87,600 bbls of water may be produced per year from the eight wells. Produced water would be disposed of via subsurface injection, surface evaporative pits, or would be used for potential beneficial use (e.g., drilling operations). Depending on the method of disposal, permits for disposal of produced water are required from the WDEQ/WQD (surface) or the Wyoming Oil and Gas Conservation Commission (WOGCC) (subsurface). SRC may rely on approved and permitted third-party vendors for produced water disposal.

**Additionally, Operator Committed Measures:**

- SRC will comply with the approved APDs, applicable laws, regulations, orders, and notices to lessees.
- SRC will obtain all necessary permits from agencies.
- SRC will incorporate measures to alleviate resource impacts as described in SRC's MSUP, Reclamation Plan, and Drilling Plan (See APD).
- SRC will install cattle guards at all roads and existing fence crossings unless otherwise directed by the landowner.
- SRC will design well pads to prevent surface runoff from entering well pad and directed away from cut and fill slopes to minimize erosion.
- SRC will construct/improve single well access roads with 16 foot subgrade and 14 foot running surface with turnouts where line of sight is limited. Access road improvements for each location are in the APD.
- SRC certifies it has a surface access agreement with the landowners.

**Rights-of-Way**

The following Rights-of-Way areas are being analyzed in this NEPA document and will be authorized under a separate Rights-Of-Way grants. Per 43 CFR 2800 regulations all uses of public lands off the lease must be authorized by a right-of-way before construction or use can occur. All 8 wells are proposed to produce from leases in addition (off lease) to the federal lease beneath the pad (on lease).

ROW Grant	ROW Action	Section	TWP	RNG	Lengths	Width
Amendment WYW-169598	Road	17,22,24,25	48N	78W,79W	16,334'	Additional 35'
WYW-168490	St Louis West, St. Louis East, San Diego & Sand Francisco well pads (4 pads)	22,23	48W	79W	33.90 acres	
					Acres of Disturbance	
					47.02	

### Reasonable and Foreseeable Development

It is reasonably foreseeable that if SRC's project is moderately successful that companies will likely fill in development for fluid minerals in the Sussex and other formations within several miles of the proposal to the extent that it is economically feasible. SRC controls leases in the SW portion of T49N, R79W, most of T48N, R79W, and the north half of T47N, R79W and is planning the CW Development project to develop these leases. The future CW Development POD will be developed based on results from the CW Exploratory POD, and tentatively consists of 20 wells on 10-14 new pads but since the design is incomplete, additional wells targeting the Sussex and additional formations may be included in future PODs associated with this development phase. Well pads are designed to accommodate up to six wells per pad; therefore, up to 60 additional wells could be drilled in the CW Development Area. While the specifics of this development area are unknown at this time, the area of development is known so the Exploratory and Development areas will be combined into the CW Exploratory POD project area for the affected environment analysis and, to the extent known, the anticipated cumulative effects analysis.

Portions of the future development areas discussed above are within greater sage-grouse core population areas, as identified by the Wyoming Game and Fish Department (WGFD) (WGFD 2011). According to the Core Policy, development activities are permitted in core areas, but with significant limitations. SRC will comply with all state and federal regulations regarding oil and gas recovery in core areas when applying for APDs for these development areas.

### 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) and generally conforms to the terms and conditions of that land use plan, and its amendments (2001, 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 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 1.1. 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 area of disturbance includes all roads, pipelines, facilities, and other surface disturbances associated with a well field. In accordance with State Director Reviews WY-2010-023, Part 2, p. 3, and fn. 7 and 2013-005, pp. 2-3, BLM does not make a distinction between surface disturbance impacts in the analysis

area attributable to well type (conventional oil and gas or CBNG) and this applies to surface disturbance issues as with soils, vegetation, wildlife, invasive species, wetlands, and cultural resources. This position supports national policy in 43 CFR 3160 et. seq, leasing, APD Form 3160-3, and 2005's Energy Policy Act (Kreckel 2007).

The January 2015 records of the WOGCC indicate 180 oil or gas wells have been drilled or are permitted to be drilled in the CW Exploratory POD project area. Of 180 wells, 169 permits are still valid (not permanently abandoned). A breakdown of these valid well permits is:

- 103 Inactive wells (shut-in, dormant, suspended operations, or temporarily abandoned);
- 54 Producing gas or oil;
- 8 Wells waiting on approval; and
- 4 Wells permitted and not drilled.

Past oil and gas drilling activity in the CW Exploratory POD project area has tested various geological horizons for hydrocarbon production at depths ranging between 930 and 9,810 feet. The WOGCC records indicate completions in the Big George, Werner, and Smith coals and the Shannon and Sussex formations, with the Big George Coal being the most prolific gas producing formation in the CW Exploratory POD project area (WOGCC 2014). As indicated above, 54 wells within the project area are currently producing gas.

**General Setting of the CW Exploratory POD project area.** The CW Exploratory POD project area is in east-central Johnson County, approximately 23 miles southeast of Buffalo and approximately 6 miles south of Interstate 90. The area includes 24 mi<sup>2</sup> (15,360 acres), located in various sections in T48N, R79W. There are approximately 115.8 acres of proposed disturbance associated with the CW Exploratory POD project area. The disturbance is associated with pad development (36.2 acres), proposed new roads (7.5 acres), improvements to existing roads (46.3 acres), a proposed staging area (12.9 acres), and a proposed storage facility (12.9 acres). A semiarid desert climate dominates the project area, which receives an average of 13.05 inches of annual precipitation, as determined from the Buffalo meteorological station (#481165). A majority of the annual precipitation comes during the summer as a result of thunderstorms. The CW Exploratory POD project area is in the Upper Powder River drainage in an area of moderately incised uplands. Surface drainage is discussed in detail in Section 3.3.2, below.

### **3.1. Air Quality**

WDEQ regulates Wyoming's air quality with oversight from the U.S. Environmental Protection Agency (EPA). The update of the Task 3A Report for the Powder River Basin Coal Review Cumulative Air Quality Effects (AECOM 2014) captures the cumulative air quality effects of present and projected PRB fluid and solid mineral development. The EPA established ozone standards in 2011. Fortification Creek Planning Area Proposed Resource Management Plan Amendment/Environmental Assessment includes an extensive discussion of the existing air quality in that area (BLM 2011).

Existing air quality in the PRB is "unclassified/attainment" with all ambient air quality standards. It is also within a prevention of significant deterioration zone. PRB air quality is a rising concern due to air quality alerts issued in 2011 - 2013 for particulate matter (PM), attributed to coal dust. Four sites monitor the air quality in the PRB: Cloud Peak in the Bighorn Mountains, Thunder Basin northeast of Gillette, Campbell County south of Gillette, and Gillette. In addition, the Wyoming Air Resource Monitoring System (WARMS) measures meteorological parameters from six sites (particulate concentrations from five of those sites) and monitors speciated aerosol (3 locations) and evapotranspiration rates (three locations). These sites are at Sheridan, Taylor Reservoir, South Coal Reservoir, Buffalo, Juniper, and Newcastle. The northeast Wyoming visibility study is ongoing by the WDEQ. Sites adjacent to the Wyoming PRB-area are at Birney on the Tongue River 24 miles north of the Wyoming-Montana border, Broadus on the Powder River in Montana, and Devils Tower.

Existing air pollutant emission sources in the region include:

- Exhaust emissions (primarily carbon monoxide (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
- Sulfur dioxide (SO<sub>2</sub>) and NOx from power plants.

### 3.2. Soils and Vegetation

The existing third order soil inventory of Johnson County, Wyoming, Northern Part (Survey Area WY719) published by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) in 2014, was used to evaluate the soil resources in the CW Exploratory POD project area (NRCS 2014a). This inventory contains information about the soils present including physical properties, suitability for reclamation, and limitations for use. There is a wide range of soil types in and adjacent to the CW Exploratory POD project area. The wide range of soil types present results largely from five soil forming factors: parent material, topography or landscape, climate, biological factors, and time.

Soils in the CW Exploratory POD project area have developed primarily from a number of different residual, alluvial and eolian parent materials including sandstones, sedimentary rock, clay, sodic, and carbonaceous shales and eolian, alluvial and colluvial materials. Soils in the CW Exploratory POD project area are highly variable and typical of soils found in semi-arid grasslands of the western United States. The climate is often characterized by cold winters and warm summers where precipitation often results from spring snowfall/snowmelt and high intensity/short duration summer thunderstorm events. The soils inventory identified four soil map units in the CW Exploratory POD with six separate taxonomic soil series in the four soil map units (Table 3.1). The parent material from which the soils are formed has a significant influence on the physical and chemical characteristics of the soils present. Upland soils within the CW Exploratory POD project area are derived from residual bedrock, shales, and sandstones as well as eolian, alluvial, and colluvial materials. Lowland or bottomland soils have developed from unconsolidated alluvial and colluvial stream sediments.

**Table 3.1. NRCS Soil Map Unit Symbols (MUS) and Unit Names in the CW Exploratory Disturbances**

Pad	MUS	Map Unit Name	Acres in AOI <sup>1</sup>	Percent of AOI <sup>1</sup>
San Francisco	632	Cushman-Shingle loams, 6 to 15 percent slopes	8.32	96.4
	684	Samday-Shingle-Badland complex, 10 to 45 percent slopes	0.27	3.6
	<b>Total</b>		<b>8.59</b>	<b>100.0</b>
San Diego	684	Samday-Shingle- Badland complex, 10 to 45 percent slopes	0.35	3.2
	687	Savageton-Samday clay loams, 3 to 15 percent slopes	9.47	96.8
	<b>Total</b>		<b>9.82</b>	<b>100.0</b>
St. Louis East	640	Forkwood-Cushman loams, 6 to 15 percent slopes	8.35	97.6
	684	Samday-Shingle- Badland complex, 10 to 45 percent slopes	0.21	2.4
	<b>Total</b>		<b>8.56</b>	<b>100.0</b>
St. Louis West	684	Samday-Shingle- Badland complex, 10 to 45 percent slopes	2.01	21.8
	687	Savageton-Samday clay loams, 3 to 15 percent slopes	7.23	78.2
	<b>Total</b>		<b>9.24</b>	<b>100.0</b>

<sup>1</sup> AOI (Area of Interest) includes pad, engineered access road, and topsoil and spoil piles, and a 10 foot buffer.

Soil depths within the CW Exploratory POD project area range from shallow to deep. Suitability of soils for reclamation and plant growth can be limited by chemical and physical characteristics. Physical characteristics that influence soil suitability include texture and saturation percentage. Soils within the CW Exploratory POD project area have textures ranging from sand to clay loam. Chemical characteristics that limit the suitability of a soil for reclamation include pH, calcium carbonate content, sodium content, and elevated salinity.

### 3.2.1. Soils Susceptible to Erosion

All six of the series within the CW Exploratory POD project area are susceptible to wind or water erosion to some extent (Table 3.2). One has a moderate wind erosion hazard, with the remaining five having a low to medium-low wind erosion hazard. Four soil series have a medium low or moderate water erosion hazard and one has a very high water erosion hazard. Surface runoff potentials vary greatly and generally increase with increasing slope.

**Table 3.2. Wind and Water Erosion Hazard Ratings and Surface Runoff and Reclamation Potential within the CW Exploration POD Disturbance Areas**

Soil Series	Hazard of Water Erosion	Hazard of Wind Erosion	Surface Runoff Potential
Badland	-- <sup>1</sup>	low	--
Cushman	moderate	medium low	high
Forkwood	very high	medium low	medium
Samday	medium low	medium low	very high
Savageton	moderate	moderate	very high
Shingle	medium low	medium low	very high

<sup>1</sup> Not rated by NRCS in the NRCS soils database for southern Campbell or Johnson counties

Source: NRCS (2014b)

### 3.2.2. Slopes in Excess of 25 Percent

Slope greatly affects a soil's stability. Greater slopes increase the potential for slumping, landslides, and water erosion. Soils with slopes of less than 25% may also be prone to high erosion because of the soil type, particle size, texture, or amount of organic matter. The amount and percentage of CW Exploratory POD pad disturbance areas of slopes less than 25% and slopes equal to or greater than 25% are indicated in Table A.1, by pad. About 0.22 acre (0.6%) of the CW Exploratory POD pad disturbance areas has slopes of 25% or more. The St. Louis West pad location has the greatest amount slopes greater than 25% (0.2 acre or 2.2% of the pad location).

### 3.2.3. Ecological Sites and Vegetation

The dominant plant communities and ecological sites associated with each pad location are predominately shallow clayey and shallow loamy sites (Table 3.3).

**Table 3.3. Dominant Soils by Map Unit Symbol (MUS) in the CW Exploratory POD Disturbance Areas**

Pad	MUS	Map Unit Name	Ecological Site
San Francisco	684	Samday-Shingle-Badland complex, 10 to 45 percent slopes	Shallow clayey/shallow loamy (R058BY158WY/R058BY162WY)
San Diego	684	Samday-Shingle-Badland complex, 10 to 45 percent slopes	Shallow clayey/shallow loamy (R058BY158WY/R058BY162WY)
St. Louis East	640	Forkwood-Cushman loams, 6 to 15 percent slopes	Loamy (R058BY122WY)
St. Louis West	687	Savageton-Samday clay loams, 3 to 15 percent slopes	Clayey/Shallow Clayey (R058BY104WY/R058BY158WY)

*Shallow Loamy (R058BY162WY) Site description and Plant community.* This site will usually occur in an upland position on rolling to steep slopes, found on all exposures, but is more common on south and west facing slopes. Landform: hill sides, ridges, and escarpments. The soils of this site are shallow (usually 8-15 inches deep) to either soft or hard sedimentary bedrock and may have noticeable gravel or channery content. These soils are well drained shallow soils or deeper soils with root growth restricted by high amounts of lime or coarse fragments. The surface soil will have one or more of the following textures: loam, sandy loam. The present plant community is a bluebunch wheatgrass/winterfat type. Grasses or grass-like plants are significant components of this plant community. Dominant grasses include bluebunch wheatgrass, needleandthread, Indian ricegrass, and thickspike wheatgrass. Other grasses occurring on the state include Letterman needlegrass, Sandberg bluegrass, prairie junegrass, bottlebrush squirreltail, Salina wildrye, and needleleaf sedge. Winterfat is the major woody plant. Other woody plants include black, low, and big sagebrush, and green rabbitbrush.

*Shallow Clayey (R058BY158WY) Site description and Plant community.* This site will usually occur in an upland position on rolling to steep slopes and is found on all exposures but is more common on south and west facing slopes. Landform: hills, ridges, and escarpments. The soils of this site are shallow (less than 20 inches to bedrock) well-drained soils formed in alluvium or residuum. These soils have moderate to slow permeability and may occur on all slopes. The bedrock is clay shale which is virtually impenetrable to plant roots. The soil textures included in this site are silty clay, clay, and the finer portions of sandy clay loam, clay loam, or silty clay loam. Thin ineffectual layers of other soil textures are disregarded. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. The surface soil will have one or more of the following textures: clay loam, clay, and sandy clay loam. The present plant community is a rhizomatous wheatgrass/green needlegrass type. Grasses or grass-like plants are significant components of this plant community. The major grasses include rhizomatous wheatgrasses, green needlegrass, and bluebunch wheatgrass. Other grasses occurring on the state include Cusick and Sandberg bluegrass, needleleaf sedge, blue grama, and plains reedgrass. Big sagebrush and winterfat are a conspicuous element of this site, occurring in a mosaic pattern.

*Loamy (058BY122WY) Site description and Plant community.* This site will usually occur on gently undulating rolling land. Landform: hills, alluvial fans, ridges. The soils of this site are deep to moderately deep (greater than 20" to bedrock), well drained and moderately permeable. 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. The surface soil will have one or more of the following textures: loam, gravelly sandy loam, and cobbly very fine sandy loam. The present plant community is a rhizomatous wheatgrasses/needleandthread/blue grama type. Grasses or grass-like plants are significant components of this plant community. The major grasses include western wheatgrass, needleandthread, and green needlegrass. Other grasses occurring in this site include Cusick's and

Sandberg's bluegrass, bluebunch wheatgrass, and blue grama. A variety of forbs and half-shrubs also occur, as shown in the preceding table. Big sagebrush is a conspicuous element of this site, occurs in a mosaic pattern, and makes up 5 to 10% of the annual production. Plant diversity is high.

*Clayey (058BY104WY) Site description and Plant community.* This site will usually occur on gently undulating rolling land. Landform: hills, alluvial fans, stream terraces. The soils of this site are moderately deep (greater than 20" to bedrock) to very deep, well-drained soils that formed in alluvium or alluvium over residuum. These soils have slow permeability. The layers of soil having the most influence on plants vary from 4 to 8 inches thick. The surface soil will vary from 2 to 5 inches deep and have one of the following textures: silty clay, sandy clay, clay, and the finer portions of silty clay loam, clay loam, and sandy clay loam. These soils may develop severe cracks. The surface soil will have one or more of the following textures: clay loam, very gravelly clay, and cobbly sandy clay loam. The present plant community is a rhizomatous wheatgrasses/needleandthread type. Grasses or grass-like plants are significant components of this plant community. The major grasses include western wheatgrass and green needlegrass. Other grasses occurring in this site include Cusick and Sandberg bluegrass, needleleaf sedge, blue grama, and plains reedgrass. Big sagebrush is a conspicuous element of this site, occurs in a mosaic pattern, and makes up 5 to 10% of the annual production. Big sagebrush may become dominant on some areas.

#### **3.2.4. Reclamation Suitability (Source Material)**

Based on pre-disturbance evaluations of pad site soil and vegetation characteristics, the reclamation potential for the four pads was assessed. The assessment considered topsoil depth, slope, aspect, the texture of the primary soil series at the pad site, and site vegetation and was based on reclamation potential determination recommendations developed by Schladweiler and Gardner (2011). According to this assessment, without reclamation and stabilization practices the reclamation potential for the St. Louis East Pad is good, the San Diego and San Francisco pads have a fair reclamation potential, and the St. Louis West Pad has a low potential. The reclamation suitability for each pad was also assessed during the onsite pad inspection conducted on October 21, 2014. Possible sandy soils were identified at the St. Louis West pad that may be susceptible to water erosion.

### **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. Fresh water used for drilling and completions will be obtained from Anadarko's Fourmile West Facility located in Section 5, T47N, R78W, approximately 5 miles south of the project area or Crazy Woman Water LLC, approximately 11 miles south of Buffalo, Wyoming. About 55,400 bbls of water would be required for drilling and completion of each well, for a total of approximately 443,200 bbls (57.1 acre-feet) of water required for all eight wells.

#### **3.3.1. Groundwater**

According to WSEO records, 268 valid (not cancelled or abandoned) wells are within the CW Exploratory POD project area (WSEO 2014). There are 232 valid wells with a CBNG use; 34 of these wells also have another permitted use (31 stock and three miscellaneous). Three valid monitoring wells are registered with the WSEO. There are 43 non-industrial use related wells registered with the WSEO in the CW Exploratory POD project area. Thirty-one non-industrial wells have a storage permitted use. The majority of non-industrial groundwater wells in the CW Exploratory POD project area are completed at depths of less than 400 feet. Note that the target depth for proposed wells averages 9000 ft.

### **3.3.2. Surface Water**

The CW Exploratory POD project area is in the Upper Powder River drainage (Hydrologic Unit Code (HUC) 10090202), in an area of moderately incised uplands. The CW Exploratory POD project area is drained by southerly flowing tributaries to Fourmile Creek and North Fork of Fourmile Creek, which flow east to the Powder River. No natural springs were identified on U.S. Geological Survey (USGS) quadrangle maps within a 1-mile radius of project area. According to WSEO records, 45 surface-water rights are currently registered (WSEO 2014). All are associated with reservoirs, with 31 stock, 10 CBNG, and 4 fisheries/stock/wildlife water rights uses.

### **3.3.3. Wetlands/Riparian**

According to National Wetlands Inventory (NWI) mapping, approximately 54.7 acres of wetlands are in the CW Exploratory POD project area (NWI 2014). Approximately 53.3 acres of freshwater emergent wetlands exist along narrow bands along a portion of North Fork Fourmile Creek and associated with depressions and ponds along tributaries to North Fork Fourmile Creek. Approximately 1.4 acres of freshwater pond wetlands are indicated associated with small stock water reservoirs within the project area (NWI 2014). Based on the NWI mapping, wetlands are indicated adjacent to the access road between mileposts 1.3 and 1.4 (from the Schoonover Road turnoff).

### **3.4. Invasive Species**

Surveys for noxious or declared weeds in the CW Exploratory POD project area were not conducted as part of the EA. BLM incorporates by reference the invasive species subsections from the Cat Creek Plan of Development EA, WY-070-04-083. The Cat Creek EA indicated that there was an infestation of Scotch thistle along Fourmile Creek, approximately 2 miles east of the CW Exploratory POD project area boundary. Canada thistle was also noted in several locations within the Cat Creek POD boundary. An infestation of Russian knapweed and Scotch thistle were also identified approximately 7 miles east of the CW POD project area, along the Powder River. No noxious or declared weeds were observed at the onsites.

Gelbhard and Belnap (2003) and Duniway et al. (2010) indicated that surface disturbances increase the proliferation of invasive or noxious species out to 0.5 miles or more from the disturbance while correspondingly compromising native communities in the same footprint. Cheatgrass (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) exist in the affected environment. These species are found in high densities and numerous locations throughout NE Wyoming. A study linked the proliferation of cheatgrass in semi-arid environments to the increased frequency and severity of wildfire (Balch et al. 2013).

### **3.5. Fish and Wildlife**

This section describes the affected environment to wildlife known or likely to occur in the area of the proposed project. The PRB FEIS identified wildlife species occurring in the PRB, pp. 3-113 to 3-206. BFO and SRC consulted several resources to identify wildlife species that may occur in the proposed project area. Resources included the wildlife database compiled and managed by the BFO wildlife biologists, the PRB FEIS, WGFD big game and greater sage-grouse (*Centrocercus urophasianus*) (GSG) maps, and the Wyoming Natural Diversity Database (WYNDD). Hayden-Wing Associates, LLC (HWA) performed a habitat assessment and wildlife inventory surveys within the CW Exploratory POD project area. HWA surveyed for mountain plovers (*Charadrius montanus*), GSG, bald eagle (*Haliaeetus leucocephalus*) winter roosts, raptor nests, and black-tailed prairie dog (*Cynomys ludovicianus*) colonies. Data on GSG, historic bald eagle winter roosts, Ute Ladies'-tresses (ULT) (*Spiranthes diluvialis*), and big game seasonal ranges were obtained from BLM and WGFD. Evaluations of big game, migratory birds, and BLM sensitive species are also included below.

### 3.5.1. Big Game

Discussions related to big game within the CW Exploratory POD project area were supplemented using information from 2013 WGFD Sheridan Region Job Competition Reports (WGFD 2014a). The CW Exploratory POD project area is designated as NOH (No Herd Unit) for elk (*Cervus elaphus*). The closest Elk Herd Unit is the Fortification Elk Herd Unit located approximately 11 miles northeast of the project area. The project area is located within the Pumpkin Buttes Mule Deer Herd Unit. The project area is designated as yearlong and winter yearlong seasonal range for the Pumpkin Buttes Herd Unit. There are no designated mule deer (*Odocoileus hemionus*) migration routes, parturition areas, or crucial ranges within the project area. The project area is located within the Crazy Woman Pronghorn Herd Unit. The project area is designated as yearlong seasonal range for the Crazy Woman Herd Unit. There are no designated pronghorn (*Antilocapra americana*) migration routes, parturition areas, or crucial ranges within the project area. The project area is located within the Powder River White-tailed Deer Herd Unit. The project area is considered OUT meaning it does not provide important habitat for the Powder River Herd Unit.

### 3.5.2. Raptors

HWA observed nine raptor species in the CW Exploratory POD project area including: American kestrel (*Falco sparverius*), bald eagle, ferruginous hawk (*Buteo regalis*), great horned owl (*Bubo virginianus*), golden eagle (*Aquila chrysaetos*), northern harrier (*Circus cyaneus*), burrowing owl (*Athene cunicularia*), red-tailed hawk (*B. jamaicensis*), and Swainson's hawk (*B. swainsoni*). Most raptor species nest in a variety of habitats including, but not limited to rock outcrops, cliffs, ridges, knolls, riparian areas, stands of trees, and single trees. Suitable nesting habitat is present in the area. The raptor species suspected or confirmed as nesting in the CW Exploratory POD project area include red-tailed hawks, golden eagles, ferruginous hawks, great horned owls, long-eared owls, American kestrels, northern harriers, and burrowing owls. The WGFD and BLM wildlife database was searched to identify any documented raptor nests within the study area. Additional raptor nests searches were conducted on the ground. HWA confirmed the presence of 84 nests within the CW Exploratory POD project area (HWA 2013). A description of the 84 confirmed nests is included in Table A.4. Nineteen nests were documented as being active in the CW Exploratory POD project area in 2014 (HWA 2014). The 19 nests include seven red-tailed hawk, five great horned owl, two golden eagle, two unknown, one northern harrier, one ferruginous hawk, and, one American kestrel.

### 3.5.3. Migratory Birds

The PRB FEIS discussed the affected environment for migratory birds, pp. 3-150 to 3-153. Migratory birds migrate for breeding and foraging at some point in the year. The BLM-FWS MOU (2010) promotes the conservation of migratory birds, as directed through Executive Order 13186 (Federal Register V. 66, No. 11). BLM must include migratory birds in every NEPA analysis of actions having potential to affect migratory bird species of concern to fulfill obligations under the Migratory Bird Treaty Act (MBTA). BLM encourages voluntary design features and conservation measures agreeing with those in the programmatic mitigation in Appendix A of the PRB ROD.

Habitats types include sagebrush steppe grasslands and 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 FWS's Birds of Conservation Concern (BCC 2008) report identifies species of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act. More information about the BCC is on the Wyoming Ecological Services website.

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 identified in Table 3.4.

Habitats in the CW Exploratory POD project area are primarily Wyoming big sagebrush, mixed-grass prairie, and grass-dominated riparian. Cottonwood riparian habitat also occurs along the larger drainages. North Fork of Fourmile Creek flows through the southern portion of the CW Exploratory POD project area and has isolated pools that persist late into the growing season. A variety of migratory birds may use these habitat communities and creeks in or near the CW Exploratory POD project area during spring/fall migrations. The Partners in Flight (PIF) organization is a collaboration between federal, state, and local government, and non-governmental agencies, that aims to enhance the conservation of birds. The Wyoming PIF identified priority species potentially occurring in the sagebrush steppe habitat type, which occurs in the CW Exploratory POD project area (Table 3.4). Raptors and threatened, endangered, or sensitive species may be in Table 3.4, but are discussed in greater detail in following sections. Several migratory species are also BLM sensitive species including mountain plover, Baird’s sparrow (*Ammodramus bairdii*), Brewer’s sparrow (*Spizella breweri*), loggerhead shrike (*Lanius ludovicianus*), sage sparrow (*Amphispiza belli*), and sage thrasher (*Lanius ludovicianus*).

**Table 3.4. Priority Bird Species Associated with the Shrub-steppe Habitat**

Level	Species, Scientific Name	WY BLM Sensitive
Level I	Ferruginous Hawk	Yes
	Greater Sage-Grouse	Yes
	Mountain Plover	Yes
	Brewer’s Sparrow	Yes
	Sage Sparrow	Yes
	McCown’s Longspur	No
Level II	Black-chinned Hummingbird, ( <i>Archilochus alexandri</i> )	No
	Loggerhead Shrike	Yes
	Sage Thrasher	Yes
	Vesper Sparrow, <i>Pooecetes gramineus</i>	No
	Lark Sparrow, <i>Chondestes grammacus</i>	No
	Lark Bunting, <i>Calamospiza melanocorys</i>	No
	Grasshopper Sparrow, <i>Ammodramus savannarum</i>	No
Level III	Common Poorwill, <i>Phalaenoptilus nuttallii</i>	No
	Say’s Phoebe, <i>Sayornis saya</i>	No

Source: Nicholoff 2003

**3.5.4. Special Status Species (SSS): Threatened, Endangered, Candidate, Sensitive Species**

There are two species in the project area that are currently designated by the USFWS as endangered, threatened, or candidate species: ULT; and the GSG (USFWS 2014).

**3.5.4.1. Threatened and Endangered Species**

**3.5.4.1.1. Ute Ladies’-Tresses (ULT)**

The ULT is threatened in Johnson County (USFWS 2012). In Wyoming, ULT are found mostly on low, flat floodplains or abandoned oxbows within 0.5 to 15 meters of a small stream. These sites are subirrigated and seasonally flooded, remaining moist in the summer (Fertig et al. 2000). The closest known population is approximately 47 miles southeast of the CW Exploratory POD project area, along Antelope Creek in northern Converse County. Other populations have been documented along Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River

in Niobrara County. Ute Ladies'-Tresses are restricted to a small, sporadic microhabitat represented by calcareous, wet-mesic, temporarily-inundated meadow in shallow wetlands (NRCS 2009).

Specific surveys for UTL have not been conducted in the CW Exploratory POD project area. Based on parameters outlined above, it is unlikely that suitable habitat occurs within the CW Exploratory POD project area. However, NWI mapping indicates wetlands adjacent to the access road between mileposts 1.3 and 1.4 (from the Schoonover Road turnoff). Vehicle turnouts are planned in the area of the wetlands.

### 3.5.4.2. Candidate Species

#### 3.5.4.2.1. Greater Sage-Grouse (GSG)

The GSG is a candidate for listing as a threatened species (USFWS 2012). The PRB FEIS has a detailed discussion on GSG ecology and habitat, pp. 3-194 to 3-199. Subsequently the FWS determined the GSG warrants federal listing as threatened across its range, but precluded listing due to other higher priority listing actions, 75 Fed. Reg. 13910 to 14014, Mar. 23, 2010; 75 Fed. Reg. 69222 to 69294, Nov. 10, 2010. GSG are a WY BLM sensitive species 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.

The State of Wyoming developed a “Core Population Area” strategy to address the significant decline of its GSG population. The Core Population Area concept focuses on maintenance and enhancement of GSG habitat, populations, and connectivity areas in the state. New development or land uses in Core Population Areas should be authorized or conducted only when it can be demonstrated that the activity will not cause declines in GSG populations. There are no GSG core areas or connectivity corridors within the CW Exploratory POD project area but a core area is adjacent to the project area. The St. Louis West pad is approximately 1.3 miles from the core area.

The State Wildlife Agencies’ Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (Colorado Division of Wildlife 2008) suggests that impacts to leks occur within 4 miles of oil and gas developments. In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (2009), WGFD categorized impacts to GSG by number of well pad locations per mi<sup>2</sup> within 2 miles of a lek and within identified nesting/brood-rearing habitats greater than 2 miles from a lek. Records (Orabona et al. 2012) indicate that 11 GSG leks occur within 4 miles of the CW Exploratory POD project area, with eight leks located within 2 miles of the project area (Table 3.5). There are currently 168 pads in the 15,360 acre project area, which amounts to a density of approximately 7.0 pads per mi<sup>2</sup>. Sparse to moderately dense stands of sagebrush with mixed grasses and forbs are present throughout the CW Exploratory POD project area.

**Table 3.5. Greater Sage-Grouse Leks within 4 Miles and 2 Miles of the CW Exploratory POD project area & 2014 Maximum Count**

Lek I.D.	TwN	Rng	Sec	QtrQtr	Males	Current WGFD Status Annual/Management <sup>1</sup>
Cat Creek 1**	48	79	9	NW/NE	1	Active/Occupied
Cat Creek 2**	48	79	17	NE/NE	21	Active/Occupied
Cat Creek 3**	48	79	3	NE/SW	25	Active/Occupied
Four Corners-State*	47	79	16	SE/W	9	Active/Occupied
Indian Creek II**	49	78	32	SE/SE	0	Inactive/Occupied
Indian Creek III**	48	78	7	SE/SE	0	Inactive/Occupied

Lek I.D.	Twn	Rng	Sec	QtrQtr	Males	Current WGFD Status Annual/Management <sup>1</sup>
Indian Creek IV**	48	79	1	SE/SE	0	Inactive/Occupied
Morris Draw*	49	79	31	NW/NW	22	Active/Occupied
Ploessers Dry Lake**	49	79	35	SWSE	1	Active/Occupied
Walker Draw**	48	80	25	SW/SE	0	Inactive/Occupied
Walker Pipeline*	47	80	1	NWNW	6	Active/Occupied

<sup>1</sup> From WGFD Sage-Grouse Database (WGFD 2014b)

<sup>2</sup> \* - Within 4 miles of the project area, \*\* - within 2 miles of the project area

### 3.5.4.3. Sensitive Species (SS)

The PRB FEIS discussed the affected environment for SS, p. 3-174 to 201. The authority for the SS comes from the ESA, as amended; Title II of the Sikes Act, as amended; the FLPMA; Department Manual 235.1.1A and BLM Manual 6840. The SS that may occur in the project area are listed in the FCPA-RMPA pp 3-33 and 3-14. The Table also includes a brief description of the habitat requirements for each species. Wyoming BLM annually updates its list of SS to focus management to maintain habitats to preclude listing as a threatened or endangered species. The policy goals are:

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

Wyoming BLM updates SS on its website: <http://www.blm.gov/wy/st/en/programs/Wildlife.html>. BLM discusses those SS impacted beyond the level analyzed in the PRB FEIS, below.

There are 25 BLM sensitive wildlife species that may occur in the Buffalo Field Office planning area. Table A.3. in the Appendix describes habitat occurrence and project effects for each of the species. The black-tailed prairie dog is discussed in detail because of specific project impacts. The burrowing owl and mountain plover are discussed below because of their association with prairie dog colonies.

#### 3.5.4.3.1. Black-tailed Prairie Dog

Black-tailed prairie dogs occupy short and mixed-grass prairies with fine, non-sandy soils for the construction of burrow systems. They typically inhabit flat lands (0-10 degree slopes) and are rarely found above 7,800 feet in elevation (May 2004, Buseck et al. 2005). Prairie dog colonies provide habitat for a variety of species, including several other sensitive species. One small active prairie dog colony exists at the proposed San Diego pad location.

#### 3.5.4.3.2. Burrowing Owl

Burrowing owls typically occupy open, dry, grasslands with short vegetation and a large amount of bare ground often in association with prairie dog colonies (Lantz et al. 2004). Burrowing owls have nested within 2 miles of the CW Exploratory POD project area but no nests have been documented within the project area (HWA 2013, 2014).

#### 3.5.4.3.3. Mountain Plover

The mountain plover typically occupies areas with vegetation shorter than that of the general surrounding area with relatively flat topography and excellent visibility. Nesting habitat usually reflects some measure of disturbance (e.g., grazing, burrowing by animals such as prairie dogs, fire, or anthropogenic factors), typical of those that occur in the short and mixed-grass prairies, as well as desert shrub habitat. These conditions are met on flat tablelands, prairie-dog colonies, alkali flats, agricultural fields, or heavily grazed sites, especially in regions where taller grasses dominate (Smith and Keinath 2004). According to

the *Atlas of Birds, Mammals, Amphibians, and Reptiles*, mountain plovers have been observed in latilong 5 (Orabona et al. 2012). Only marginal mountain plover habitat exists within the CW Exploratory POD project area and mountain plovers were not observed in the CW Exploratory POD project area in 2014 (HWA 2014).

### 3.5.5. Aquatics

The PRB FEIS discussed the ecosystem and fishery, pp. 3-153 to 3-166. The CW Exploratory POD project area is in the Upper Powder River drainage (HUC 10090202). The CW Exploratory POD project area is drained by southerly flowing tributaries to Fourmile Creek and North Fork of Fourmile Creek, which flow east to the Powder River. No natural springs were identified on U.S. Geological Survey (USGS) quadrangle maps within a 1-mile radius of project area.

The WDEQ/WQD classifies Fourmile Creek and North Fork of Fourmile Creek as 3B (WDEQ/WQD 2001). The highest use for a 3B classified stream is *other aquatic life*. The WDEQ evaluates streams to determine what streams are threatened or impaired relative to the use classification - listed in Wyoming's 2012 305(b) Water Quality Assessment Report (WDEQ 2012). According to the report, no surface water bodies in the CW Exploratory POD project area are threatened or impaired.

Table 3.7 lists the fish found in the Upper Powder River sub-basin and their WGFD NSS designation. Seven of the species that may occur in the Upper Powder River sub-basin have designations as either NSS 1,2, or 3 species. Species in these designations are species of concern, in need of more immediate management attention and more likely subject to future petitioning under the ESA. For these species WGFD recommends that no loss of habitat function occur.

**Table 3.9 Fish Occurring in the Upper Powder River Sub-basin**

Wyoming Native Species Status	Species	Wyoming BLM Sensitive
NSS1	Sturgeon chub	No
NSS2	Goldeye	No
	Sauger	No
NSS3	Black bullhead	No
	Flathead chub	No
	Mountain sucker	No
	Plains minnow	No
NSS4	Channel catfish	No
	Northern redhorse	No
	Quillback	No
	River carpsucker	No
	Stonecat	No
NSS6	Fathead minnow	No
	Plains killifish	No
NSS7	Longnose dace	No
	Sand shiner	No
	White sucker	No
None	Common carp	No
	Rock bass	No
	Shovelnose sturgeon	No

### 3.6. 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 that are generally found within BFO the reader is referred to the *Draft Cultural Class I Regional Overview, Buffalo Field Office* (BLM, 2010). Previously reviewed and accepted Class III cultural resource inventories (BFO #s 70040168; 70060006; 70060002; 70040096; 70030035; 70020168; 70040037 cover the proposal area. The following resources are located in or near the proposed project area.

#### Cultural Resources Located In or Near the Project Area

Site Number	Site Type	NRHP Eligibility
48JO2332	Historic	NE
48JO2523	Prehistoric and Historic	E
48JO3108	Prehistoric	NE
48JO3175	Prehistoric and Historic	NE
48JO1969	Historic	NE
48JO1973	Historic	NE

## 4. ENVIRONMENTAL EFFECTS

### 4.1. 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 (Table 2.1). This updated the no action alternative and historical 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 oil and gas field operations would continue, as would the development of approved single and multi-well pads. 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.

### 4.2. Alternative B – Proposed Action

#### 4.2.1. Air Quality

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 operator will control the amount of air pollutant emissions during construction by watering disturbed soils and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. Air quality impacts modeled in the Task 3A Report for the Powder River Basin Coal Review Cumulative Air

Quality Effects (AECOM 2014) concluded that in general, modeled pollutant concentrations in areas not influenced by wildfire are below the NAAQS and state AAQS and are similar to or lower than concentrations in 2008 (the base year for modeling). This project is within the projected development Task 3A Report analysis parameters.

#### **4.2.2. Soils and Vegetation**

Oil and gas development and traditional activities of livestock grazing and wildlife use impact current soil and vegetation conditions in the CW Exploratory POD project area. Area soils are easily damaged by use or disturbance or are difficult to re-vegetate or otherwise reclaim. Soil and vegetation impacts (e.g., roads, linear pipeline scars, and artificial wet areas) can be readily observed in the area. In the absence of recoverable topsoil as is common throughout the area, the surface organic matter in the form of vegetation and litter are critical to maintaining the integrity and viability of the soil.

##### **4.2.2.1. Direct and Indirect Effects**

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

- Mixing of horizons – occurs where construction on roads, or other activities take place. Mixing may result in removal or relocation of organic matter and nutrients to depths where 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 disturbance may change the ecological integrity of the site and the recommended seed mix.
- 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 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, compressor stations, roads, water-handling facilities or other semi-permanent facilities result in loss of vegetation and affect reclamation success for the life of the project.
- Soils will be subjected to wind and water erosion. Soil erosion would affect soil health and productivity. Erosion rates are site specific and are dependent on soil, climate, topography, and cover.
- Constructed well pads and access roads will consist of cut and fill slopes in excess of 25%. These conditions are being mitigated through design features and operated committed measures described in the MSUP and Reclamation Plan. The majority of the well pads will be constructed with cut and fill slopes of 1.5H:1V (67%). Where possible cut and fill slopes will be flattened to 3H:1V (33%). All cut and fill slopes will be in excess of 25% and will be maintained at these slopes during the construction and drilling phase of the project. Stabilization of 33% slope can be manageable; however, very steep slopes (67%) are very challenging if not impractical to stabilize, and revegetate to meet the requirements of the Wyoming Reclamation Policy. These constructed slopes will be bare ground void of vegetation with the fill slopes being less stable due to soil mixing. Sediment transport from the surface disturbance areas is likely to be extensive even with proposed mitigation measures implemented. As described in the MSUP, erosion control measures used to reduce sediment transport from cut and fill slopes may include utilization of earthen dikes along the fill portion of the drilling pad perimeter, stabilization of slopes with straw waddle and/or geogrids, installation of silt fences, location of a reserve pit in the cut portion of the drilling pad with the pad constructed to slope toward a collection area.

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

#### **4.2.2.1.1. Soils Susceptible to Erosion**

Table 3.2 indicates one soil (Forkwood) with a very high wind erosion hazard delineated in the CW Exploratory POD pad disturbance areas (NRCS 2014). The St. Louis East pad includes approximately 8.4 acres of Forkwood-Cushman soil. There are no soils series with a severe hazard of wind erosion delineated in the CW Exploratory pad disturbance areas (Table 3.2). Possible sandy soils were identified at the St. Louis West pad during the October 21, 2014 onsite inspection and BLM recommended the implementation of erosion control measures on cut/fill slopes if sandy soils are encountered.

#### **4.2.2.1.2. Slopes in Excess of 25 Percent**

As described in Chapter 3, only approximately 0.22 acre (0.6 %) within the CW Exploratory POD pad disturbance areas have existing slopes greater than or equal to 25 %. Existing slopes in excess of 25% will be impacted at the St. Louis East (0.02 acres) and St. Louis West (0.20 acres) pads. Site specific reclamation and stabilization practices are described in Table 4 of the Reclamation Plan and additional erosion control and/or stabilization practices are presented in Management Prescriptions/Recommendations of the Reclamation Plan. Erosion control will be monitored at each location as described in the MSUP and the Reclamation Plan and as specified by the required SWPPP.

#### **4.2.2.1.3. Reclamation Suitability (Source Material)**

A reclamation potential assessment (without reclamation and stabilization practices) identified a low potential for reclamation at the St. Louis West Pad and possible sandy soils were identified at the St. Louis West pad during the onsite inspection. BLM recommended the implementation of erosion control measures on cut/fill slopes if sandy soils are encountered. If successful, erosion control practices the reclamation potential would raise the reclamation potential from low to fair.

#### **4.2.2.2. Cumulative Effects**

The PRB FEIS defined the designation of the duration of disturbance, p. 4-1 and 4-151. Most soil disturbances would be short term impacts with expedient interim reclamation and site stabilization, as committed to by SRC in their POD MSUP, Reclamation Plan, and as required by the BLM in COAs. Geomorphic effects of roads and other surface disturbance range from chronic and long-term contributions of sediment into waters of the state to catastrophic effects associated with mass failures of road fill material during large storms. Roads can affect geomorphic processes primarily by: accelerating erosion from the road surface and prism itself through mass failures and surface erosion processes; directly affecting stream channel structure and geometry; altering surface flow paths, leading to diversion or extension of channels onto previously unchanneled portions of the landscape; and causing interactions among water, sediment, and debris at road-stream crossings. These impacts, singly or in combination, could increase the potential for valuable soil loss due to increased water and wind erosion, invasive plant spread, and increased sedimentation and salt loads to the watershed system. The project's anticipated surface disturbance of 115.8 acres for eight wells averages 14.5 acres per well. Approximately 63% of this proposed disturbance is associated with improvements to existing roads and for a staging area and a storage facility. As such, the per-well disturbance footprint of future development would be less than the exploratory phase since the development phase would likely utilize portions of CW Exploration POD infrastructure.

#### **4.2.2.3. Mitigation Measures**

SRC planned the CW Exploratory POD project to maximize the fluid mineral drainage while avoiding areas with soil limitation where possible; see Table A.1. SRC designed the infrastructure, to the extent possible, using existing oil/gas roads to access the proposed wells and minimized a need for engineered roads. The constructed well pads will be designed and placed to minimize cut and fill slopes. SRC

committed measures in the MSUP and the Reclamation Plan and pad design drawings will rectify impacted areas by repairing, rehabilitating and/or restoring the affected environment. SRC's design features will reduce impacts over time by preservation and maintenance operations during the life of the action. Refer to the CW Exploratory POD MSUP, Reclamation, and Drilling plans included with the APD for detailed descriptions of proposal design features and construction practices.

#### **4.2.2.4. Residual Effects**

Residual effects across the POD would include a long-term loss of soil productivity associated with well pads and roads. The PRB FEIS identified residual effects (p. 4-408) such as the loss of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established. Due to the presence of erosive soils and the topography of the CW Exploratory POD project area erosion will occur. As will rilling and gullyng of cut and fill slopes. Impacts to stabilized cut and fill slopes from livestock will limit soils stabilization and will limit the establishment of vegetation.

The PRB FEIS reads, pp. 4-1 and 4-151, “[f]or 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 SRC's plans and BLM applied mitigation. Construction of new access roads is reduced by placing the wells so that existing oil/gas access roads are used and by using directional drilling techniques to complete multiple wells from a single pad. These practices result in less surface disturbance and overall environmental impacts. See Section 2.2 for summary of disturbance. All disturbances associated with the proposed action are long term. The reclamation status of the proposed disturbance in the CW Exploratory POD project area are generally rated as fair to high when erosion control measures are used. Field observations show areas of reclamation success in previously disturbed lands. 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.

#### **4.2.3. Water Resources**

Adherence to the standard 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. SRC will have to produce the wells for a time to be able to estimate the volume and quantity of water production. To comply with Onshore Order Oil and Gas Order No. 7 Disposal of Produced Water, SRC will submit a Sundry to the BLM within 90 days of first production, which includes a representative water analysis and the final proposal for water management. The quality of water produced in association with conventional oil and gas historically was such that surface discharge would not be possible without treatment. Initial water production is quite low in most cases. There are 3 common alternatives for water management: re-injection, deep disposal, or disposal into evaporation ponds. All alternatives would be protective of water resources when performed in compliance with state and federal regulations.

##### **4.2.3.1. Groundwater**

###### **4.2.3.1.1. Direct and Indirect Effects**

Under the proposal, groundwater resources could be impacted by increased use for operations (drilling, completion, and dust suppression), by removal of water during production (produced water), and by contamination. Under the proposal, eight wells would be drilled on four new well pads. Water acquired from an approved source would be used to supply operations. The proposal could produce an estimated 3.5 million bbls of water over the life of the project, assuming a 40-year life of each of the eight wells and 30 bbls produced per day per well. Groundwater could be affected during construction of wells/well pads

or by other subsurface project-development activities. The most probable pathway for groundwater contamination would be undetected spills and leachate from leaking produced-water facilities or mud pits. Undetected defects in either casing installation or cementing would be the most probable scenario for groundwater contamination to occur from actual oil well drilling and completion activities. Leakage from fresh water storage pits used in HF operations or other storage pits needed for well completion has the potential to leach salts from soils and impact shallow groundwater. Chemicals used for production drilling could cause local contamination of soils and groundwater if not managed properly.

The potential for the contamination of near-surface aquifers from using oil-based mud (OBM) in the mud system will be eliminated via the techniques outlined in Section 2.2. These techniques include the use of a semi-closed mud system during the actual drilling operation combined with recycling of the OBM fluids and the solidification of the cuttings upon completion of operations. SRC will drill a test hole at each pad location in those rare instances where groundwater may be encountered within 60 feet of the surface to determine the depth to groundwater; see the administrative record (AR). If groundwater was present within 60 feet of existing ground level, SRC will use an adequately sized temporary storage tank in place of a fresh-water storage pit to prevent any shallow groundwater contamination, per WOGCC (2010) regulations, Chapter 1, Section 2(nn), and Chapter 4, Section 1(j).

By design, the BLM approves APDs and associated drilling plans to protect potential potable/usable groundwater intervals. The construction of well pads, proper disposal practices, proper well casing and cementing, and recycling of drilling fluids would be in accordance with BLM guidelines, which would minimize adverse effects on groundwater quality. Using the estimates of water required for the various phases of well drilling and completion, the total per well water requirement would be approximately 55,400 bbls (7.1 acre feet [ac-ft]). Anticipated average water production is estimated to be 30 bbls per day per well (annual production of 10,950 bbls per well). At peak, 87,600 of water may be produced per year from eight wells. Produced water would be disposed of via subsurface injection, surface evaporative pits, or would be used for potential beneficial use (e.g., drilling operations). Depending on the method of disposal, permits for disposal of produced water are required from WDEQ/WQD (surface) or WOGCC (subsurface). SRC may rely on approved and permitted third-party vendors for produced water disposal.

During the initial phase of well production the produced oil and water will be stored in tanks and then periodically transported by truck off location to either approved Class II disposal wells or/and an evaporation facility. HF will be used to develop all of the CW Exploratory POD wells. The HF process is currently being regulated or is being evaluated by the EPA, the BLM, and the WOGCC. In June of 2004, the EPA issued a report evaluating the impacts to underground sources of drinking water by hydraulic fracturing of CBNG reservoirs (EPA 2004). The 2004 EPA study did not find confirmed evidence that drinking water wells have been contaminated by hydraulic fracturing fluid injection into CBNG wells, p. ES-16. A 2011-2012 U.S. Geological Survey study found no groundwater effects from thousands of deep horizontal fracturing gas wells (USGS 2012). No occurrences of drinking water contaminated by HF are recorded in the CW Exploratory POD project area and no studies related to impacts from HF were reported in the CW Exploratory POD project area.

Newly adopted WOGCC regulations require operators to provide the Commission with the exact chemical content of their HF fluid. While the information may be held as proprietary, the Commission will be able to provide WDEQ with the chemical composition of the HF if there is ever a question of aquifer contamination. Depending on the lithology of the host rock undergoing HF, it is expected that HF effects would not extend beyond 500 feet from the well bore. Accordingly, the potential for contamination of groundwater by the HF fluids would be limited to this distance from each well over the production interval. Because HF would be conducted at considerable depths (9,500 to 13,000 feet below ground surface), there is a remote, minimal likelihood of affects to groundwater near the surface.

#### **4.2.3.1.2. Cumulative Effects**

BFO RMP, p. 26 contained a reasonable foreseeable development scenario of 800 wells per year and projected water use of 2.8 ac-ft per well for the average oil well. The 2003 PRB ROD projected 3,200 oil wells which would include the use 8,960 ac-ft of water. Cumulative impacts to groundwater resources in the CW Exploratory POD project area would include the CW Development phase.

#### **4.2.3.1.3. Mitigation Measures**

The use of state-of-the-art drilling and well-completion techniques and the implementation of Best Management Practices (BMPs) and COAs related to drilling are implemented will mitigate significant impacts related to degradation of groundwater quality, including comingling of groundwater from distinct aquifers. Surface casing for all wells will be extended to a minimum depth of 2,500 feet. Protection shall be accomplished by cementing surface casing back to the surface and cementing intermediate casing with sufficient cement volume to attempt to bring cement 200' Total Vertical Depth (TVD) above the top of the Fox Hills formation. Top and base of the Fox Hills formation will be verified by Measurement While Drilling (MWD) Gamma Ray.

### **4.2.3.2. Surface Water**

#### **4.2.3.2.1. Direct and Indirect Effects**

The project's main impacts to surface-water resources will be sediment loading caused by surface disturbance from development/maintenance and impacts from contamination of surface water via the accidental discharge (spill) of HF fluids, drilling fluids, and produced water. The potential for surface spills of fuels or other contaminants that could impact surface-water quality will be reduced through the implementation of BMPs, implementation of the Spill Prevention Control and Countermeasures (SPCC) plan, and compliance with other state and federal regulations. The severity of these impacts depend upon several factors: slope aspect and gradient, susceptibility of the soil to erosion, degree and extent of soil disturbance, and mitigation measures implemented. Short- and long-term disturbance acres would increase due to the area needed to accommodate the proposed well pads. Impact from the additional amount of short- and long-term disturbance could increase the potential for erosion and off-site sedimentation.

#### **4.2.3.2.2. Cumulative Effects**

The primary cumulative impacts to surface-water resources would be sediment loading caused by surface disturbance from project development/maintenance and impacts from contamination of surface water from the accidental discharge (spill) of HF fluids, drilling fluids, and produced water. The 2003 PRB FEIS ROD projected 3,200 oil wells which would include the use 8,960 ac-ft of water (BLM 2003). Cumulative impacts to surface-water resources in the CW Exploratory POD project area would include the CW Development phase.

#### **4.2.3.2.3. Mitigation Measures**

Channel crossings by road and pipelines will be perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads, per the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM. Channel crossings by pipelines will be constructed so that the pipe is buried at least 4 feet below the channel bottom. SRC will expediently stabilize and revegetate disturbance within channel and floodplain associated with this project. Implementation of mitigation measures will offset significant impacts related to degradation of surface-water quality, including sediment loading caused by surface disturbance from development/maintenance and impacts from contamination of surface water via the accidental discharge (spill) of HF fluids, drilling fluids, and produced water.

#### **4.2.3.2.4. Residual Effects**

Downcutting (stream erosion) and sediment deposition (aggradation) are natural processes that occur as stream drainages age through time. Downcutting occurs in the upper reaches of a drainage system as the stream channel becomes incised through erosion, until the slope of the stream and its velocity are reduced and further erosion is limited. Sediment is deposited in the lower, slower reaches of a stream. Surface drainages could be degraded from erosion caused by increased surface flow. Increased flows could cause downcutting in fluvial environments, resulting in increased channel capacity over time in the upper and middle reaches of surface drainages (BLM 2003).

#### **4.2.3.3. Wetland/Riparian**

Approximately 54.6 acres of NWI delineated wetlands are in the CW Exploratory POD project area; a majority (53.3 acres) of these wetlands are associated with areas along North Fork Fourmile Creek and related to depressions and reservoirs on tributaries to North Fork Fourmile Creek; see Section 3.3.3, above. Isolated freshwater pond wetlands were also associated with small stock water reservoirs in the CW Exploratory POD project area. As discussed in Section 3.3.3, the only potential for wetlands disturbance related to the proposed CW Exploratory POD project occurs along the access road between mileposts 1.3 and 1.4, where vehicle turnouts are proposed in the vicinity of freshwater pond wetlands.

The wetlands in this area will be avoided. As such, the proposal's direct, indirect, and cumulative effects should not result in a material increase in wetlands impacts associated with these drainages. Watershed values, including natural drainages, would not be adversely impacted by the proposal with properly applied mitigation. Other water resources will not be adversely impacted by the proposal. Possible contamination effects of fresh water aquifers will be reduced through the use of tested casing, by setting casing at appropriate depths and by following safe repair procedures in the event of casing failure. Other downhole well operations should result in minimal impacts using standard engineering practices. BLM foresees no residual effects beyond those in the analysis parameters in the PRB FEIS.

#### **4.2.4. Invasive Species**

##### **4.2.4.1. Direct and Indirect Effects**

SRC 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 frequency; 2) preventive practices; and 3) education. Cheatgrass and to a lesser extent, Japanese brome exist in the affected environment. The use of existing facilities along with the surface disturbance associated with construction of proposed access roads, pipelines, and related facilities will present opportunities for weed proliferation such as salt cedar, Canada thistle, and perennial pepperweed.

##### **4.2.4.2. Cumulative Effects**

The project's surface disturbances would create a favorable environment for the proliferation of noxious weeds/invasive plants and will contribute to an increased likelihood of wildfire and its severity while also bolstering a road network useful for firefighting. Cumulative impacts from invasive species in the CW Exploratory POD project area would include the CW Development phase.

##### **4.2.4.3. Mitigation Measures**

SRC committed to the control of noxious weeds in the measures from their IPMP; see APDs and AR. Mitigation as required by BLM applied COAs will reduce potential impacts from noxious weeds and invasive plants.

##### **4.2.4.4. Residual Effects**

Residual effects in the project area include a long-term loss of soil productivity associated with well pads and road construction. SRC's control efforts are limited to the surface disturbance associated the implementation of the project. Cheatgrass and other invasive species that are present in non-physically

disturbed areas of the project area are anticipated to continue to spread unless control efforts are expanded. Cheatgrass and to a lesser extent, Japanese brome are found in such high densities and numerous locations throughout NE Wyoming that a control program is not feasible at this time; these annual bromes would continue to be found in the area.

#### **4.2.5. Fish and Wildlife**

The WGFD's Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats identifies impact thresholds and the types of management and mitigation recommended to avoid, minimize, or offset impacts to important wildlife species and habitats (WGFD 2009).

##### **4.2.5.1. Big Game**

The PRB FEIS analyzed impacts to big game, pp. 4-181 to 4-210. Direct and indirect impacts to mule deer and pronghorn may occur through alterations in hunting and/or poaching, increased vehicle collisions, harassment and displacement, increased noise, increased dust, alterations in nutritional status and reproductive success, increased fragmentation, loss or degradation of habitats, reduction in habitat effectiveness, and declines in populations. The Crazy Woman Exploratory POD project will disturb approximately 115.8 acres of occupied pronghorn and mule deer habitat at four well pads and associated access roads throughout T48-43N, R79W. Refer to the PRB FEIS for big game cumulative impacts, p. 4-211. Cumulative impacts to big game in the CW Exploratory POD project area would include the CW Development phase. SRC's will mitigate affects to big game by using existing roads to the extent possible (reduces the project's big game habitat loss), implementing company prescribed speed limits (lowered) to minimize vehicle collisions, and through timely reclamation of disturbed areas, where possible. Project residual effects will continue displacing big game and will likely contribute to population declines.

##### **4.2.5.2. Raptors**

###### **4.2.5.2.1. Direct and Indirect Effects**

The PRB FEIS discussed direct and indirect effects to raptors (pp. 4-216 to 4-221). This project could result in direct and indirect habitat losses associated with declines in habitat effectiveness.

Although no nests have been identified within 0.5 mile of the proposed well pads, future nest initiation in the project area may be precluded. Segments of the proposed access routes to the project area come within 0.5 miles of several red-tailed hawk and great-horned owl nests but construction activity will remain outside FWS recommended buffers for the species. 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.

###### **4.2.5.2.2. Cumulative Effects**

The cumulative effects associated with the proposal are within the analysis parameters and impacts described in the PRB FEIS, p. 4-221. Cumulative impacts to raptors anticipated with the Development phase are the same or similar to those with within the CW Exploratory POD project area Exploratory area.

###### **4.2.5.2.3. Mitigation Measures**

Because no known raptor nests are within 0.5 miles of the proposed well pads and existing access routes to the project area will be used, no mitigation measures will be applied.

#### **4.2.5.2.4. Residual Impacts**

Residual impacts will be the same as the direct and indirect impacts described above.

#### **4.2.5.3. Migratory Birds**

##### **4.2.5.3.1. Direct and Indirect Effects**

The PRB FEIS discussed the direct and indirect effect to migratory birds, pp. 4-231 to 4-235. Disturbance of habitat in the project area is likely to impact migratory birds. Native habitats will be lost directly with the construction of wells, roads, and pipelines. Activities will likely displace migratory birds farther than the immediate area of physical disturbance. 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 m of dirt roads in a natural gas field. Effects occurred along roads with light traffic volume (less than 12 vehicles per day). The increasing density of roads constructed in developing natural gas fields exacerbated the problem creating substantial areas of impact where indirect habitat losses through displacement were much greater than the direct physical habitat losses.

##### **4.2.5.3.2. Cumulative Effects**

The cumulative effects associated with Alternative B are within the analysis parameters and impacts described in the PRB FEIS, p. 4-235, for details on expected cumulative impacts. Cumulative impacts to migratory birds anticipated with the Development phase are the same or similar to those with within the CW Exploratory POD project area.

##### **4.2.5.3.3. Mitigation Measures**

To reduce the likelihood of a "take" under the MBTA, the BLM biologist will require a COA to implement measures to exclude migratory birds from all facilities, including, but not limited to, heater/treaters, flare stacks, and secondary containment where escape may be difficult or wildlife toxicants are present. Habitat removal will also be prohibited associated with the St. Louis East and West well pads and their new access routes during the migratory bird nesting season (May 1 – July 31) unless a pre-construction nest survey (within approximately 10 days of construction planned May 1-July 31) is completed. If surveys will be conducted, the operator will follow "2012 Sage-brush BLM Sensitive Migratory Bird Nest Protocol" found at the following web address: [http://www.blm.gov/wy/st/en/field\\_offices/Buffalo/wildlife.html](http://www.blm.gov/wy/st/en/field_offices/Buffalo/wildlife.html). The COAs for habitat removal timing restriction and the implementation of exclusion measure will provide adequate protection for nesting sagebrush obligate birds and is adequate in reducing the potential for a take under the MBTA.

##### **4.2.5.3.4. Residual Effects**

Migratory birds remain vulnerable where timing limitations recommendations are not applied and migratory bird species are nesting. In addition, timing limitation recommendations do little to mitigate loss and fragmentation of habitat. Migratory birds nesting adjacent to the well pads, or roads, may be displaced, abandon nests, or suffer reduced productivity due to disruptive activities associated with construction, drilling, completions, production activities, and reclamation activities that occur during the breeding season. Prompt revegetation of short-term disturbance areas should reduce habitat loss impacts.

#### **4.2.5.4. Threatened, Endangered, Candidate, Special Status (Sensitive) Species**

##### **4.2.5.4.1. Threatened and Endangered Species**

###### **4.2.5.4.1.1. Ute Ladies'-Tresses Orchid (ULT)**

The PRB FEIS discussed the cumulative effects to ULT, pp. 4-253 to 4-254. As discussed in Section 3.5.4.1, above, it is unlikely that suitable habitat occurs within the CW Exploratory POD project area. However, NWI mapping indicates wetlands adjacent to the access road between mileposts 1.3 and 1.4 (from the Schoonover Road turnoff) and vehicle turnouts are planned in the area of the wetlands. The proposed road work will not impact the wetlands. There will be "*no effect*" to ULTs.

#### **4.2.5.4.2. Candidate Species**

##### **4.2.5.4.2.1. Greater Sage-Grouse**

###### **4.2.5.4.1.2.1. Direct and Indirect Effects**

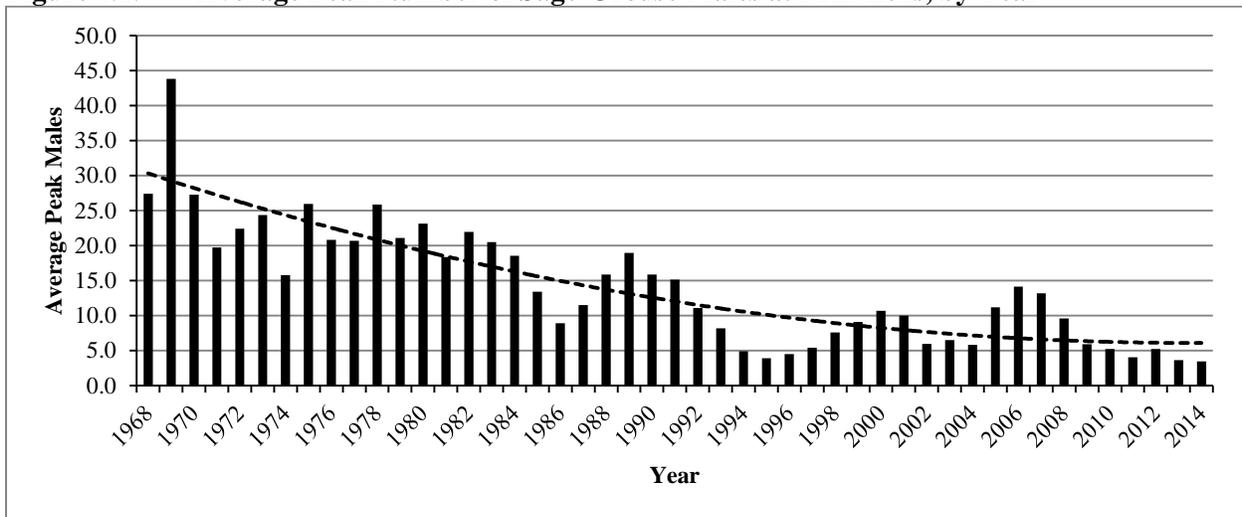
Impacts to GSG are generally a result of loss and fragmentation of sagebrush habitats associated with roads and infrastructure and to impacts to breeding grounds. The *12-Month Findings for Petitions to List the Greater Sage-Grouse (Centrocercus urophasianus) as Threatened or Endangered* (USFWS 2010) and Chapters 15-21 of *Greater Sage-Grouse Ecology and Conservation of a Landscape Species and its Habitats* (Knick and Connelly 2011) discuss in detail impacts to GSG associated with energy development. PRB FEIS discussed direct and indirect impacts to GSG, pp. 4-257 to 4-273. In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (2009), WGFD categorized impacts to GSG by number of well pad locations per mi<sup>2</sup> within 2 miles of a lek and within identified nesting/brood-rearing habitats greater than 2 miles from a lek. Moderate impacts occur when well density is between one and two well pad locations per mi<sup>2</sup> or where there is less than 20 acres of disturbance per mi<sup>2</sup>. High impacts occur when well density is between two and three well pad locations per mi<sup>2</sup> or when there are between 20 and 60 acres of disturbance per mi<sup>2</sup>. Extreme impacts occur when well density exceeds three well pads per mi<sup>2</sup> or when there are greater than 60 acres of disturbance per mi<sup>2</sup>. All three levels of impact result in a loss of habitat function by directly eliminating habitat; disrupting wildlife access to, or use of habitat; or causing avoidance and stress to wildlife. Research shows that declines in lek attendance correlate with oil and gas development. Projections show in a typical PRB CBNG landscape that energy development within 2 miles of leks reduces the average probability of lek persistence from 87% to 5% (Walker et al. 2007). Several studies showed that well density is a useful metric for evaluating impacts to GSG, as measured by declines in lek attendance (Braun et al. 2002, Holloran et al. 2005, and Walker et al. 2007). These studies indicated that oil or gas development exceeding approximately one well pad per mi<sup>2</sup> resulted in calculable impacts on breeding populations, as measured by the number of male GSG attending leks (Colorado Division of Wildlife 2008). The research described below suggests that, in part, these declines may be a result of CBNG development in this region of Wyoming and that the leks in the cumulative impact assessment area are experiencing similar declines.

The proposed CW Exploratory POD would add four additional wells pads to 168 existing well pads within the CW Exploratory POD project area, which would increase the pad density from 7.0 to 7.2 wells per mi<sup>2</sup>. Eight occupied (WGFD annual management status) GSG leks are within 2 miles of the proposed CW Exploratory POD project area but only one pad is within 2 miles of a lek. The St. Louis West pad is approximately 1.9 miles from the Cat Creek 2 lek. Implementation of this proposal will result in additional sagebrush habitat removal and could result in the functional loss of habitat (wintering, nesting, and brood rearing) from fragmentation and anthropogenic activity.

The following measures from the Master Surface Use Plan (operator committed) will support BLM IM WY-2012-019 and will reduce the potential for the impacts described under Direct and Indirect Effects:

- Establish speed limits are recommended to reduce the potential for vehicle/wildlife collisions or design roads to be driven at slower speeds.
- The control of the spread and effects from non-native plant species.
- Pads will be out of line-of-sight of occupied leks.
- Wells will be clustered (multiple wells per pad using directional drilling).
- The timing restrictions described in the Mitigation Measures section below.

**Figure 4.1. Average Peak Number of Sage-Grouse Males at PRB Leks, by Year**



Source: WGFD 2014b

#### 4.2.5.4.1.2.2. Cumulative Effects

The PRB FEIS reads 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).” Recent research suggests that the cumulative (synergistic) effects of current and foreseeable oil and gas development in an area occupied by GSG are likely to impact this local GSG population, cause declines in lek attendance, and may result in local extirpation. Analysis of impacts up to 4 miles was recommended by the State Wildlife Agencies’ Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (Colorado Division of Wildlife 2008). Therefore, the cumulative impact assessment area for this project encompasses the project area and a 4-mile radius.

The GSG population in northeast Wyoming exhibited a steady long term downward trend, as measured by lek attendance (WGFD 2014b). Figure 4.1 illustrates a 10-year cycle of periodic highs and lows. For the most part, each subsequent population peak was lower than the previous peak. Research suggests that these declines may be a result, in part, of CBNG development (USFWS 2010). 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.

There have been 801 wells drilled within 4 miles of the CW Exploratory POD project area (WOGCC data consulted December 24, 2014). Excluding the CW Exploratory POD proposal, there are 769 proposed wells (Automated Fluid Minerals Support System [AFMSS] March 6, 2013) in the cumulative effects analysis area. Of these, 176 are approved APDs, 78 are APD/NOSs, 479 are unapproved APDs, and 36 are unapproved NOSs. With the addition of the proposed wells, well density increases from 6.1 wells/mi<sup>2</sup> to 9.1 wells per mi<sup>2</sup> significantly above the one well/mi<sup>2</sup> recommendation by the State Wildlife Agencies’ Ad Hoc Committee for Sage-Grouse and Oil and Gas Development. Based on the impacts described in the PRB FEIS and the findings of more recent research, the proposed action may contribute to a decline in attendance at the 11 leks that occur within 4 miles of the project area.

#### **4.2.5.4.1.2.3. Mitigation Measures**

To minimize the overall impacts to GSG in the CW Exploratory POD project area that could result from surface disturbance activities associated with the proposal, the following COAs are required:

- No surface disturbing activities are permitted within 2 miles of an occupied lek during GSG breeding and nesting periods (March 15 – June 30) for the two federal wells to be drilled on the St. Louis West pad and access road.
- For any surface-disturbing activities proposed in sagebrush shrublands, the SRC will conduct clearance surveys for GSG breeding activity during the GSG breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 miles of the proposed surface disturbance activities. This will apply to all proposed or approved surface disturbances. All survey results shall be submitted in writing to a Buffalo BLM biologist no later than July 31 of the current year. This condition will be implemented on an annual basis for the duration of surface disturbing activities. A Buffalo BLM biologist shall be notified if a previously unknown lek is identified during surveys (April 1-May 7).
- Disruptive activities are restricted on or within one quarter (0.25) mile radius of the perimeter of occupied or undetermined greater sage-grouse leks from the hours of 6:00 pm – 8:00 am from March 15 – May 15.

#### **4.2.5.4.1.2.4. Residual Effects**

A timing limitation restricting surface disturbance does not mitigate habitat loss, fragmentation or changes in disease mechanisms. Noise and human disturbance resulting from hydraulic fracturing, maintenance and production activities are likely to impact GSG nesting in the area for the life of the project. Suitability of the project area for GSG will be negatively affected due to habitat loss, fragmentation, and proximity of human activities associated with oil and gas development.

The BLM made a commitment to support the management objectives set by the State of Wyoming, to maintain populations and habitats. In addition, the BFO identified the following objectives in the current RMP: maintain a biological diversity of animal species, support the WGFD population objectives, maintain or improve quality of wildlife habitat, and provide habitat for special status habitat species (BLM 2001).

The PRB FEIS predicted that the PRB oil and gas development would have significant impacts to the GSG population. The impact of the CW Exploratory POD development cumulatively contributes to the potential for local extirpation. Alternative B and the COAs applied are consistent with current BLM and Wyoming GSG conservation strategies and the anticipated effects are within the parameters of the PRB FEIS/ROD.

Current research does not identify specific components of energy development that measurably decrease impacts to GSG or their habitats. Even in areas where a variety of mitigation measures were applied, negative population impacts were still measurable when well density exceeded 1 well per square mile. Management of energy development based on current core area configurations and associated lease stipulations, conditions of approval, and best management practices (BMPs), may not be sufficient to protect the population viability of PRB GSG.

With application of Standard Operating Procedures (SOP's), applied mitigation, Required Design Features and Conditions of Approval identified for Greater Sage-Grouse under the proposed action, impacts caused by surface-disturbing and disruptive activities would be minimized.

#### **4.2.5.5.1. Sensitive Species (SS)**

BLM supports the policies set forth in SSS policy (BLM Manual 6840). BLM Manual 6840.22A states that "The BLM should obtain and use the best available information deemed necessary to evaluate the

status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary.” The PRB FEIS discusses impacts to sensitive species on pp. 4-257 to 4-265. Table A.3 in the Appendix shows project specific impacts to BLM sensitive species. The black-tailed prairie dog is further discussed below because of direct project impacts. Burrowing owls and mountain plovers are discussed below because of their relationship to prairie dogs. Nine other SS species may be impacted by surface disturbance, dust, noise and human presence associated with the development of the CW Exploratory POD. These species are known to occur in the project area or likely to occur in the project area but no specific information is available. These species are identified in the table with the MIIH designation in the project effects column.

#### **4.2.5.5.1.1. Black-tailed Prairie Dog**

The PRB FEIS discusses direct and indirect impacts to black-tailed prairie dog on pp. 4-255 and pp. 4-256. The San Diego pad will directly impact approximately 5 acres of prairie dog habitat. This represents approximately 42% of the colony, as mapped in the BFO database. Alternative pad configuration would cause further resource impacts in unstable terrain. A change in pad location would require “flipping” the surface location of the two wells to the two bottom hole locations requiring two pads with an increased need for access roads and associated infrastructure which would represent in a significant increase in surface disturbance. Prairie dogs are highly resilient and should return to the area that is reclaimed. The residual effects are within the parameters found in the PRB FEIS, pp. 4-257 to 4-273.

#### **4.2.5.5.1.2. Western Burrowing Owl**

No burrowing owl nests have been identified in the project area including the prairie dog colony that exists at the proposed San Diego pad location. Proposal activities may have direct and indirect impacts to habitat, but will not likely contribute to a trend towards federal listing or a loss of population viability. The proposal’s cumulative effects are within the analysis parameters and impacts described in the PRB FEIS. See the Raptor section for residual effects.

#### **4.2.5.5.1.3. Mountain Plover**

The PRB FEIS analyzed the direct and indirect impacts to mountain plover, pp. 4-254 to 4-255. Only marginal mountain plover habitat exists within the CW Exploratory POD project area (HWA 2014). BFO recommends a 0.25 mile timing limitation on surface-disturbing activities for potential nesting habitat during the nesting season to reduce impacts to nesting mountain plovers. However, timing limitations do not reduce impacts to habitat as drilling and construction activity outside the nesting season will result in habitat loss for this species. Surface-disturbing activities may displace mountain plovers, even with the collateral mitigating effect of timing limitations of other activities associated with development. Traffic and construction activities that are not prohibited by the timing limitations may degrade habitat quality sufficiently to render the area unsuitable for some mountain plovers. Residual effects include possible mortalities from traffic and non-surface-disturbing activities. The proposed activities may affect individuals or habitat but, due to the presence of only marginal mountain plover nesting habitat, the project will not likely contribute to a trend towards federal listing or a loss of viability to the population or species.

### **4.2.6. Aquatics**

Water would be produced in association with conventional oil and gas development but the CW Exploratory POD project will not result in discharges into surface waters associated with the project. As such, the proposed project will not affect species that rely on aquatic habitats.

#### **4.2.6.1. West Nile Virsu**

The proposal's direct, indirect, and cumulative effect is it may result in small, isolated instances of standing surface water which may increase mosquito breeding habitat. There are other sources of natural standing water in the proposal area that add mosquito habitat. Water pooling for more than 4 days in hot weather contribute to *Culex* mosquito hatches. Other sources of water include; natural flows, livestock watering facilities, water pooled in road ruts and ditches, human outdoor water use, and features in and around communities. BLM requires no mitigation measures. There is little evidence that treatment, either through the use of larvicides or malithion, on a site specific or basin-wide scale will have any effect on the overall spread of the disease;

#### **4.2.7. Cultural Resources**

##### **4.2.7.1. 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 contributing portions of eligible site 48JO2523 will be physically impacted. Non-eligible sites 48JO3175, 48JO3108, 48JO1969, 48JO1973, 48JO2332 have the potential to be impacted. Following the *State Protocol Between the Wyoming Bureau of Land Management State Director and The Wyoming State Historic Preservation Officer*, Section V(E)(v)(b) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 02/13/15 that the project will result in "No Adverse Effect". 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 must be followed. Further discovery procedures are explained in Standard COA (General)(A)(1) and Appendix K of the Wyoming Protocol.

##### **4.2.7.2. Cumulative Effects**

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

Fee actions constructed in support of federal actions can result in impacts to historic properties. Oil and gas development on split estate often includes construction of infrastructure that does not require permitting by BLM. Project applicants may integrate infrastructure associated with wells draining fee minerals with wells that require federal approval. BLM has no authority over fee actions, which can impact historic properties. BLM has the authority to modify or deny approval of federal undertakings on private surface, but that authority is limited to the extent of the federal approval. Historic properties on private surface belong to the surface owner and they are not obligated to preserve or protect them. The BLM may go to great lengths to protect a site on private surface from a federal undertaking, but the same site can be legally impacted by the landowner at any time. Archeological inventories reveal the location of sensitive sites and although the BLM is obligated to protect site location data, information can potentially get into the wrong hands resulting in unauthorized artifact collection or vandalism. BLM authorizations that result in new access can inadvertently lead to impacts to sites from increased visitation by the public.

##### **4.2.7.3. Mitigation Measures**

If any cultural values (sites, features or artifacts) are observed during operation, they will be left intact

and the Buffalo Field Manager notified. If human remains are noted, the procedures described in Appendix L of the PRB FEIS must be followed. Further discovery procedures are explained in Standard COA (General)(A)(1) and Appendix K of the Wyoming Protocol.

#### 4.2.7.4. Residual Effects

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

### 5. CONSULTATION/COORDINATION AND LIST OF PREPARERS

**BLM consulted or coordinated with the following on this analysis. OSP (Onsite Presence):**

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Grant Melvin	SRC	Y	Darrin Tromble	WWC Engineering	Y
Rob Schamel	SRC	Y	John Berry	WWC Engineering	N
Kelly Nairn	SRC	Y	Patricia Clark	Landowner	Y
Jim Kniser	SRC	Y	Gene Mankin	Landowner	Y
Brad Bentz	SRC	Y			

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LIE	Kristine Phillips	Grazing Management	NA
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Assistant Field Manager	Clark Bennett	NEPA Coordinator	Tom Bills

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**APPENDIX A. Supporting Tables**

**Table A.1. Percent Slopes Associated with the CW Exploratory POD Disturbance Areas<sup>1</sup>**

<b>% Slope</b>	<b>Acres</b>	<b>% of Project Area</b>
<b>San Francisco</b>		
Less than 25%	8.59	100.0%
Greater than or Equal to 25%	0.00	0.0%
Total	8.59	100.0%
<b>San Diego</b>		
Less than 25%	9.82	100.0%
Greater than or Equal to 25%	0.00	0.0%
Total	9.82	100.0%
<b>St. Louis East</b>		
Less than 25%	8.54	99.8%
Greater than or Equal to 25%	0.02	0.2%
Total	8.56	100.0%
<b>St. Louis West</b>		
Less than 25%	9.04	97.8%
Greater than or Equal to 25%	0.20	2.2%
Total	9.24	100.0%

<sup>1</sup> Does not include Template road disturbance

**Table A.2. References for the No Action Alternative from the PRB FEIS**

Resource		Type of Effect	Page(s) of PRB FEIS
Project Area Description	Geologic Features and Mineral Resources	Direct and Indirect Effects	4-164 and 4-134
		Cumulative Effects	4-164 and 4-134
Soils, Vegetation, and Ecological Sites	Soils	Direct and Indirect Effects	4-150
		Cumulative Effects	4-152
	Vegetation	Direct and Indirect Effects	4-163
		Cumulative Effects	4-164
	Wetlands/Riparian	Direct and Indirect Effects	4-178
		Cumulative Effects	4-178
Wildlife	Sensitive Species – Greater Sage-Grouse	Direct and Indirect Effects	4-271
		Cumulative Effects	4-271
	Aquatic Species	Direct and Indirect Effects	4-246
		Cumulative Effects	4-249
	Migratory Birds	Direct and Indirect Effects	4-234
		Cumulative Effects	4-235
	Waterfowl	Direct and Indirect Effects	4-230
		Cumulative Effects	4-230
	Big Game	Direct and Indirect Effects	4-186
		Cumulative Effects	4-211
	Raptors	Direct and Indirect Effects	4-224
		Cumulative Effects	4-225
Water	Ground	Direct and Indirect Effects	4-63
		Cumulative Effects	4-69
	Surface Water	Direct and Indirect Effects	4-77
		Cumulative Effects	4-69
Economics and Recovery of CBNG Resources		Direct and Indirect Effects	4-362
		Cumulative Effects	4-370
Cultural Resources		Direct and Indirect Effects	4-286
Air Quality		Direct and Indirect Effects	4-386
		Cumulative Effects	4-386
Visual Resources		Direct and Indirect Effects	4-313
		Cumulative Effects	4-314

**Table A.4. Raptor Nests Located Within 0.5 Mile of the CW Exploratory POD project area<sup>1</sup>**

HWA ID	BLM ID <sup>2</sup>	Species	Substrate <sup>3</sup>	UTM NAD 83		Legal Location			
				Eastin g	Northin g	QQ	SE C	TW N	RN G
1326	4867	Northern Harrier	GHS	394434	4881632	NWNE	2	47N	79W
1351	No ID	Unknown Raptor	CTL	397302	4890179	NESW	6	48N	78W
1173	13026	Unknown Raptor	CTL	397141	4885146	SESW	19	48N	78W
1200	1985	Red-tailed Hawk	CTL	397131	4885148	SESW	19	48N	78W
1185	13045	Unknown Raptor	CTL	396976	4882501	SESW	31	48N	78W
1212	1270	Red-tailed Hawk	CTL	397043	4882478	SESW	31	48N	78W
1242	5212	Unknown Raptor	CTL	396989	4882506	SESW	31	48N	78W
1257	2037	American Kestrel	CKB	396896	4882686	SWNW	31	48N	78W
1765	No ID	Unknown Raptor	CTL	396973	4882708	SESW	31	48N	78W
1773	No ID	Unknown Raptor	CTL	396869	4882662	SWNW	31	48N	78W
1136	6063	Burrowing Owl	BUR	391356	4889317	SWNE	9	48N	79W
1211	6353	Red-tailed Hawk	CTL	392764	4888870	NWSE	10	48N	79W
1269	4855	Red-tailed Hawk	CTL	392676	4889069	SWNE	10	48N	79W
1251	1999	Red-tailed Hawk	CTL	393558	4888444	SWSW	11	48N	79W
1267	4852	American Kestrel	CLF	393550	4888443	SWSW	11	48N	79W
1352	No ID	Unknown Raptor	CTL	393591	4889560	NWN W	11	48N	79W
1774	No ID	Red-tailed Hawk	CTL	393610	4889537	NWN W	11	48N	79W
1176	13032	Unknown Raptor	CTL	395729	4886584	SESW	13	48N	79W
No ID	4969	Unknown Raptor	CTL	395734	4886575	SESW	13	48N	79W
1252	2003	Long-eared Owl	CTL	395563	4886756	SESW	13	48N	79W
1353	No ID	Red-tailed Hawk	CTL	394464	4887589	SWNE	14	48N	79W
1182	13040	Unknown Raptor	RUS	390910	4887256	NESW	16	48N	79W
No ID	4872	Burrowing Owl	BUR	390002	4887314	NESE	17	48N	79W

1232	3459	Ferruginous Hawk	GHS	391300	4886180	SWNE	21	48N	79W
1233	3460	Ferruginous Hawk	GHS	391088	4885985	SWNE	21	48N	79W
1780	No ID	Ferruginous Hawk	CTL	390689	4885691	NESW	21	48N	79W
1808	No ID	Unknown Raptor	CTL	391392	4885142	SESE	21	48N	79W
1249	1995	Red-tailed Hawk	CTL	392874	4886145	SWNE	22	48N	79W
1782	No ID	Golden Eagle	CTL	392861	4886177	NWNE	22	48N	79W
1175	13031	Unknown Raptor	CTL	395871	4886454	NWNE	24	48N	79W
1177	13033	Unknown Raptor	CTL	395760	4886489	NENW	24	48N	79W
1194	13030	Unknown Raptor	CTL	395871	4886454	NWNE	24	48N	79W
1266	4851	Great Horned Owl	CTL	395855	4886448	NWNE	24	48N	79W
1277	3809	Great Horned Owl	CTL	396083	4886032	SWNE	24	48N	79W
1322	4854	Northern Harrier	GHS	395711	4886224	NENW	24	48N	79W
1328	4869	Northern Harrier	GHS	394773	4883488	SESE	26	48N	79W
1810	No ID	Unknown Raptor	CTL	394808	4883454	SESE	26	48N	79W
1208	1993	Red-tailed Hawk	CTL	391886	4883820	NWSW	27	48N	79W
1210	1263	Long-eared Owl	CTL	391863	4883880	NWSW	27	48N	79W
1237	3491	Long-eared Owl	CTL	391875	4883587	SWSW	27	48N	79W
1261	3565	Red-tailed Hawk	CTL	391851	4883915	NWSW	27	48N	79W
1140	3489	Unknown Raptor	CTL	391047	4884958	NWNE	28	48N	79W
1186	13046	Unknown Raptor	RUS	389622	4884262	SWNE	29	48N	79W
1234	3461	Unknown Raptor	CTL	389422	4884066	NWSE	29	48N	79W
1335	5151	Northern Harrier	GHS	389552	4883910	NWSE	29	48N	79W
1371	No ID	Unknown Raptor	CTL	389549	4883935	NWSE	29	48N	79W
1206	1991	Great Horned Owl	CTD	391542	4882222	NESE	33	48N	79W
1276	3189	Red-tailed Hawk	CTL	391474	4882190	NESE	33	48N	79W
1309	5149	Unknown	CTL	390327	4882644	SWNW	33	48N	79W

		Raptor							
1310	5150	Red-tailed Hawk	CTL	390913	4882647	SENW	33	48N	79W
1346	No ID	Unknown Raptor	CTL	391278	4882252	NWSE	33	48N	79W

**Table A.4. Raptor Nests Located Within 0.5 Mile of the CW Exploratory POD project area<sup>1</sup>**

HWA ID	BLM ID <sup>2</sup>	Species	Substrate <sup>3</sup>	UTM NAD 83		Legal Location			
				Eastin g	Northin g	QQ	SE C	TW N	RN G
1347	No ID	Unknown Raptor	CTL	390376	4882948	SWNW	33	48N	79W
1778	No ID	Unknown Raptor	CTL	390603	4882765	SENW	33	48N	79W
1779	No ID	Unknown Raptor	CTL	390512	4882781	SWNW	33	48N	79W
1139	3187	Unknown Raptor	CTL	393332	4882770	SENE	34	48N	79W
1183	13042	Unknown Raptor	CTD	392234	4882305	NESW	34	48N	79W
1184	13043	Unknown Raptor	RUS	392124	4882412	NWSW	34	48N	79W
1191	3188	Golden Eagle	CTL	392399	4882271	NESW	34	48N	79W
1258	1994	Golden Eagle	CTL	392399	4882271	NESW	34	48N	79W
1312	453	Unknown Raptor	CTL	392311	4882331	NESW	34	48N	79W
1327	4868	Northern Harrier	GHS	393021	4882876	SENE	34	48N	79W
1345	No ID	Unknown Raptor	CTL	391969	4882217	NWSW	34	48N	79W
1768	No ID	Golden Eagle	CTL	392416	4882529	NESW	34	48N	79W
1769	No ID	Golden Eagle	CTL	392478	4882446	NESW	34	48N	79W
1770	No ID	Golden Eagle	CTL	392163	4882181	NESW	34	48N	79W
1138	3186	Unknown Raptor	CTL	393351	4882700	SWNW	35	48N	79W
1178	13035	Unknown Raptor	CTL	393414	4882745	SWNW	35	48N	79W
1180	13038	Unknown Raptor	CTL	394008	4882823	SENW	35	48N	79W
1271	4860	Unknown Raptor	CTL	394253	4883045	NWNE	35	48N	79W
1285	4709	Great Horned Owl	CTL	394075	4882822	SENW	35	48N	79W
1286	4710	Golden Eagle	CTL	393360	4882810	SWNW	35	48N	79W
1323	4861	Unknown Raptor	CTD	394176	4883079	NWNE	35	48N	79W
1763	No ID	Unknown Raptor	CTL	393710	4882847	SWNW	35	48N	79W
1134	2035	Unknown Raptor	CTL	396458	4882749	SENE	36	48N	79W

1156	6618	Red-tailed Hawk	CTL	395717	4882917	NENW	36	48N	79W
1158	10615	Unknown Raptor	CTL	396283	4882794	SENE	36	48N	79W
1179	13037	Unknown Raptor	CTL	395375	4882917	NENW	36	48N	79W
1248	3878	Long-eared Owl	CTL	395372	4882914	NENW	36	48N	79W
1314	1268	Unknown Raptor	CTL	394968	4883087	NWN W	36	48N	79W
1325	4863	Unknown Raptor	CTL	395598	4882939	NENW	36	48N	79W
1764	No ID	Unknown Raptor	CTL	395613	4882890	NENW	36	48N	79W
1202	1987	Great Horned Owl	CTL	389885	4892097	NWSW	33	49N	79W
1203	1988	Unknown Raptor	CTL	389963	4892097	NWSW	33	49N	79W
1124	5770	Unknown Raptor	CTL	395813	4891435	SESE	36	49N	79W

<sup>1</sup> Project area includes Crazy Woman Exploratory POD area and anticipated Development Phase area

<sup>2</sup> Nests with no BLM ID # were discovered in 2012 and 2013

<sup>3</sup> BUR - Burrow

CKB - Creek Bank

CLF - Cliff

CTD - Cottonwood - Dead

CTL - Cottonwood - Live

GHS - Ground

RUS - Russian Olive