

### 3.0 AFFECTED ENVIRONMENT

This chapter describes the affected environment in the vicinity of the Proposed Action (the project area) as it exists today, where pertinent existing development, impacts, and disturbances are described. This description is organized by resource with descriptive information taken from a wide range of sources including the BLM and various other federal and state agencies as appropriate.

Critical elements of the human environment, their status in the Project Area, and their potential to be affected by the Proposed Action are listed in Table 3.1.

**Table 3.1**  
**Critical Elements of the Human Environment <sup>1</sup>**

Critical Element	Status on the Project Area	Addressed in Text of EA
Air Quality	Not Affected	Yes <sup>2</sup>
Areas of Critical Environmental Concern	None Present	No
Cultural Resources	Potentially Affected	Yes
Environmental Justice	Not Affected	Yes
Farmlands, prime or unique	None Present	No
Floodplains	Not Affected	Yes <sup>2</sup>
Native American Religious Concerns	Not Affected	No
Invasive Non-Native Species	Potentially Affected	Yes
Threatened and Endangered Species	Potentially Affected	Yes
Wastes, hazardous or solid	None Present	No
Water Quality (surface and ground water)	Potentially Affected	Yes <sup>2</sup>
Wetland/Riparian Zones	Not Affected	No
Wild and Scenic Rivers	None Present	No
Wilderness	None Present	No

<sup>1</sup> From the BLM NEPA Handbook H-1790-1 (BLM 1988, 1999).

<sup>2</sup> Briefly discussed in Section 3.1: Environmental Elements Considered with Minor Effects.

### 3.1 ENVIRONMENTAL ELEMENTS CONSIDERED WITH MINOR EFFECTS

The following resources would not be adversely affected by implementation of the Proposed Action. As a consequence, these resources will be addressed briefly in this section but will not be addressed in Chapter 4.0 (Environmental Consequences).

### 3.1.1 Air Quality

The Wyoming Department of Environmental Quality (WDEQ) operates a series of State and Local Air Monitoring Sites (SLAMS) through the state with the nearest SLAMS sites located in the city of Casper (approximately 42 miles southwest of the project area) and at the Antelope Coal Mine in Converse County (approximately 23 miles northeast of the project area). The Casper SLAMS site measures PM<sub>10</sub> (particulate matter less than 10 microns in size) and the Antelope Coal Mine SLAMS site monitors PM<sub>2.5</sub> (particulate matter less than 2.5 microns in size) and NO<sub>x</sub> (nitrogen oxides). A third SLAMS site in south Campbell County (approximately 75 miles north/northeast of the project area) also measures ozone (O<sub>3</sub>) levels, in addition to PM<sub>10</sub> and NO<sub>x</sub>. Data collected at the three referenced SLAMS sites through 2007 show that all of these monitors are in attainment with National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD) increment standards (WDEQ 2008).

Construction emissions associated with the Proposed Action would include PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub>, CO, and VOCs. These emissions would result primarily from construction, drilling and completion activities, would be temporary in nature, would occur in isolation at each proposed well location and would generate an almost undetectable level of emissions that would be limited to the near-field with no impact in the far-field (BLM 2005). As a result, emissions resulting from the construction and drilling of the eight proposed wells in the Hornbuckle Field would be short-term in nature and would not have a long-term or lasting effect upon air quality or visibility within the airshed of the Hornbuckle Field, Converse County, or the State of Wyoming.

While no air quality analyses have been conducted in this general area, analyses conducted in Natrona County, Wyoming in conjunction with environmental analyses of the Cave Gulch-Bullfrog-Waltman Natural Gas Development Project (BLM 1997), the Cooper Reservoir Natural Gas Development Project (BLM 1998), and the Wallace Creek Extension 3D Vibroseis Project (BLM 2002) concluded that no significant impacts would occur to air quality or the air shed as a result of the activities proposed in conjunction with these respective projects.

### 3.1.2 Floodplains

The access road to the proposed BR Federal #24-26H crosses the Dry Fork Cheyenne River (Dry Fork) and the well location falls on a terrace above (north of) the Dry Fork. Soils along the Dry Fork in the vicinity of the Proposed Action are identified as the Clarkelen-Haverdad-Bigwinder complex (Soil Map Unit #109), which are found primarily on flood plains and on low terraces along major streams (NRCS 1986). As stated in Section 3.1.7.1, the Dry Fork is ephemeral in nature within the overall project area and surface water is not generally present therein except during periods of runoff from snow melt or heavy precipitation events in the area. Likewise a review of floodplain maps created by the Federal Emergency management Agency (FEMA) did not identify any jurisdictional floodplains in the project area (FEMA 2009).

### **3.1.3 Range Management**

The Proposed Action would not result in any new construction activity (surface disturbance) on federal lands. While no federal lands would be affected by the Proposed Action, the long-term disturbance of approximately 18.86 acres of private surface estate would translate into a concomitant loss of forage as discussed in Section 3.1.6. This loss of forage would reduce the amount of grazing available for domestic livestock production for each of the affected private surface owners. Likewise, road construction associated with the Proposed Action would impact existing range improvements and oilfield-related traffic on those roads would create dust, could result in collisions with domestic livestock, and could generally disrupt ranching activities on the affected properties.

In this regard, agreements negotiated between SWPC and the affected surface owners for access to and construction of the proposed roads and well locations would provide for compensation to these owners for the surface disturbance associated with the Proposed Action thereby offsetting these impacts. These agreements typically also include operational provisions designed to mitigate impacts to existing range improvements, livestock losses resulting from operations, noxious weed invasion, etc. that may adversely affect their ranching activities.

### **3.1.4 Recreation**

The general project area consists of a mosaic of fee, state, and federal lands, with those federal lands located within the project area isolated due to a lack of a public access thereto and access is strictly controlled by the private surface owners in the area. Moreover, considering that there are no special recreation management areas or developed recreational sites within the project area and the ownership patterns, recreational opportunities are somewhat limited and would not be adversely affected by the Proposed Action.

### **3.1.5 Socio-Economics**

Neither the economy of Converse County nor the quality of life for the residents thereof would be adversely affected by the Proposed Action. As described in Chapter 2.0, additional oil/gas exploration and development activity in the Hornbuckle Field would not result in an increase in the local workforce, with a concomitant burden on the resources of Converse County and/or the infrastructure thereof. In point of fact, implementation of the Proposed Action would actually have a positive impact on the economy of Converse County through increased revenues generated by additional hydrocarbon production should any/all of the proposed wells prove to be commercially productive.

### **3.1.6 Vegetation**

Considering that there are no threatened or endangered plant species or species proposed for listing as either threatened or endangered plant species known to occur within the overall project

area (see Section 4.5.1.4), the long-term disturbance of 18.86 acres (see note below) over the life of the project (LOP) does not represent a significant impact to plant communities within the project area.

NOTE: The long-term disturbance figures referenced above are derived from those areas that have not been reclaimed within five years of initial disturbance. In this regard, approximately 71% of each well pad and 30% of each forty foot access road ROW are expected to be reclaimed in the short-term resulting in the following long-term disturbance: 11.40 acres for well locations and 7.46 acres for access roads (or a 62% overall reduction in initial disturbance as a result of interim reclamation activities).

### **3.1.7 Water Resources**

#### **3.1.7.1 Ground Water Resources**

A review of the electronic records of the office of the Wyoming State Engineer (WSE) revealed that there are twelve permitted water wells within a one mile radius of the eight horizontal oil wells proposed by SWPC in the Hornbuckle Field. Information on these existing water wells is provided in Table 3.2.

The average depth of these water wells is 327 feet, with actual depths ranging from a minimum of 125 feet to a maximum depth of 636 feet. As stated in Section 2.1.2, SWPC intends to drill the surface hole with a fresh water mud system and then set approximately 3,200 feet of steel surface casing, which would be cemented in place from top to bottom, thereby preventing any potential communication between and/or cross-contamination of the near surface water aquifers in the project area. The use a fresh water mud system to drill the surface hole would eliminate any potential for contamination of near surface water aquifers from the oil-based mud system utilized for drilling operations below 3,200 feet.

The potential for the contamination of near-surface water aquifers from the use of OBM in the mud system has been eliminated through the techniques outlined in Section 2.1.2.1 which include the use of an impermeable plastic/vinyl pit liner during the actual drilling operation combined with recycling of the OBM fluids and the solidification of the “contaminated” cuttings upon completion of operations.

It should be noted that the Wyoming Oil and Gas Conservation Commission (WOGCC) required SWPC to use a closed mud system for drilling operations on the BR Fee #11-35V (located in the NW¼NW¼ of Section 35, T38N, R73W) as the well was located in close proximity to the Dry Fork Cheyenne River at a ground elevation of 4,955.6 feet. The proposed BR Federal #24-26H is also located in fairly close proximity to the Dry Fork Cheyenne River at an elevation of 4,949.6 feet. SWPC has indicated that they would drill a test hole on the location to determine the depth to ground water. Should ground water be encountered within twenty feet of the surface in the test hole, a closed mud system would used during the drilling operation to prevent any shallow ground water contamination in accordance with Chapter 1, Section 2(kk) of the rules and regulations of the WOGCC (WOGCC 2008).

**Table 3.2**

**Existing Water Wells within a One Mile Radius of the Eight Horizontal Wells Proposed in the Hornbuckle Field <sup>1</sup>**

Permit Number	Permit Type	Legal Location of Water Well				Well Depth
		Quarter	Section	Township	Range	
P14637P	Stock	NW¼SE¼	19	37 North	72 West	???
P70818W	Miscellaneous	NW¼NW¼	4	37 North	73 West	140'
P23698W	Domestic	NE¼NW¼	10	37 North	73 West	300'
P68591W	Domestic	SE¼NW¼	10	37 North	73 West	300'
P9159P	Stock	SE¼NE¼	14	37 North	73 West	250'
P617W	Stock	SW¼NW¼	20	38 North	73 West	125'
P48800W	Stock	SW¼SW¼	21	38 North	73 West	400'
P1363W	Stock	NE¼SW¼	23	38 North	73 West	636'
P617W	Industrial <sup>2</sup>	SW¼NW¼	27	38 North	73 West	370'
P19973P	Stock	SW¼SW¼	27	38 North	73 West	410'
P9164P	Stock	SE¼NE¼	29	38 North	73 West	???
P19974P	Stock	SW¼SE¼	33	38 North	73 West	340'

1 Water wells within a one mile radius of the proposed surface well location. Data gathered from the computerized records of the Wyoming State Engineer's Office: <http://seo.state.wy.us>.

2 Primary water source well for drilling operations in the Hornbuckle Field

3.1.7.2 Surface Water Resources

There are no perennial (flowing) streams within the overall project area, so there is a limited potential for surface water contamination as a result of operations associated with the Proposed Action. Construction and reclamation techniques outlined in Chapter 2 combined with any Conditions of Approval (COAs) applied to individual permit approvals would minimize the potential impact to surface water resources and resultant water quality resulting from oil/gas exploration activities associated with the Proposed Action. As a consequence, we do not anticipate any adverse impacts to surface or sub-surface water quality as a result of the Proposed Action.

### 3.1.8 Wetland/Riparian Habitat

A review of the National Wetland Inventory (NWI) maps maintained by the U.S. Fish and Wildlife Service (USFWS) did not identify any jurisdictional wetlands that would be impacted by activities associated with the Proposed Action (WYNDD 2009).

### 3.1.9 Visual Resources

The overall project area is within a Class IV Visual Resource Management (VRM) area where changes may subordinate the original composition and character of the basic elements of the landscape, but must reflect what could be a natural occurrence within the characteristic landscape (BLM 1982). No impacts to Visual Resources would result from the Proposed Action considering that the project area is well removed from public roads within this area of northern Converse County, combined with the fact that all permanent above-the-ground structures (not subject to safety considerations) would be painted a flat, non-reflective earth tone color (see Section 2.1.4).

## 3.2 GENERAL SETTING OF THE PROJECT AREA

The general project area is located approximately twenty (20) miles west of Bill, Wyoming and twenty-seven miles north/northeast of Glenrock, Wyoming at elevations ranging from 4,950' at the proposed BR Federal #24-26H well location to 5,315' at the proposed HR Federal #44-20H well location. The project area is situated on the southern flank of the Cheyenne River Divide in an area of gently to moderately rolling uplands. Drainage in the area is generally to the northeast via three intermittent tributaries of the Cheyenne River including (from north to south) the Dry Fork Cheyenne River, Brush Creek and Duck Creek.

The eight proposed wells are situated within the Powder River Basin, a Level IV Eco-Region located within the Northwestern Great Plains Level III Eco-Region - an area of rolling plains (short-grass prairie) that is predominately used for dryland farming and livestock grazing (EPA 2009). Mean annual precipitation in the Powder River Basin (1961-1990) averaged between eleven and fifteen inches, mean annual temperature (1961-1990) averaged between 45° and 50° Fahrenheit (F) with 151 to 170 annual days with a minimum temperature at 32°F or below and 29 to 35 annual days with a maximum temperature above 90°F (Curtis et al. 2004).

The Powder River Basin Eco-Region is a generally classified as a western mixed-grass/short-grass prairie with vegetation in the specific project area characterized by blue grama (*Bouteloua gracilis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), fringed sagewort (*Artemisia frigida*), green needlegrass (*Nassella viridula*), Hood's phlox (*Phlox hoodii*), little bluestem (*Schizachyrium scoparium*), prairie junegrass (*Koeleria macrantha*), prairie sandreed (*Calamovilfa longifolia*), needle-and-thread (*Stipa comata*), threadleaf sedge (*Carex filifolia*) and western wheatgrass (*Pascopyrum smithii*). Non-grass/forb species found in the upland areas include prickly pear cactus (*Opuntia* sp.), sagebrush (*Artemisia* sp.), yucca (*Yucca* sp.) and

broom snakeweed (*Gutierrezia saraothrae*), with cottonwood trees (*Populus* sp.) found along the major drainages including Duck Creek and the Dry Fork Cheyenne River.

### 3.3 EXISTING DEVELOPMENT IN THE HORNBUCKLE FIELD PROJECT AREA

The Hornbuckle Field is situated in Townships 37 and 38 North, Range 73 West and encompasses approximately 24,320 acres (+/-) in northern Converse County, Wyoming. The field was discovered in 1983 with the completion of the Highland Flats Federal #32-2 in the Sussex Formation by Louisiana Land and Exploration Company. The Highland Flats Federal #32-2 was drilled in the SW¼NE¼ of Section 2 in Township 37 North, Range 73 West to a total depth of 13,500 feet to test the productive potential of the Dakota Formation, but was subsequently plugged back to 11,800 feet and completed in the Sussex and First Frontier Formations. Initial production from the Highland Flats Federal #32-2 was reported as 55 BOPD (barrels of oil per day) and 49 MCF (thousand cubic feet) of natural gas. There are currently 44 wells producing from the Sussex Formation in the field with cumulative production of 3,822,452 BO (barrels of oil) and 1,424,491 MCF of natural gas. SWPC currently has three horizontal wells producing from the Sussex Formation in the Hornbuckle Field (WOGCC 2009). Existing (producing) wells within the Hornbuckle Field are identified in Table 3.3.

**Table 3.3**  
**Producing Wells in the Hornbuckle Field <sup>1</sup>**

Well Name and Number	Legal Location of Well				Producing Formation(s)	Well Status <sup>2</sup>
	Quarter	Section	Township	Range		
Highland Flats #12-2	SW¼NW¼	2	37 North	73 West	Sussex	POW
Highland Flats #14-2	SW¼SW¼	2	37 North	73 West	Sussex	POW
Highland Flats #31-3	SW¼NE¼	2	37 North	73 West	Sussex	POW
Highland Flats #34-2	SW¼SE¼	2	37 North	73 West	Sussex/Parkman	PGW
Highland Flats #22-3	SE¼NW¼	3	37 North	73 West	Sussex	POW
Highland Flats #31-3	NW¼NE¼	3	37 North	73 West	Sussex	POW
Highland Flats #43-3	NE¼SE¼	3	37 North	73 West	Sussex	POW
BB & B #31-10	NW¼NE¼	10	37 North	73 West	Sussex	POW
Baker #1	SE¼SE¼	10	37 North	73 West	Sussex	POW
BB & B #11-11	NW¼NW¼	11	37 North	73 West	Sussex	POW
Baker #11-7	SW¼NE¼	11	37 North	73 West	Sussex	POW
Highland Flats #13-11	NW¼SW¼	11	37 North	73 West	Sussex	POW
Highland Flats #34-11	SW¼SE¼	11	37 North	73 West	Sussex	POW
Highland Flats #13-13	SW¼NE¼	13	37 North	73 West	Sussex	POW
Highland Flats #23-14	NE¼SW¼	14	37 North	73 West	Sussex	POW
Reynolds Fee #34-14	SW¼SE¼	14	37 North	73 West	Sussex	POW
State #11-14	N½NW¼	14	37 North	73 West	Sussex	POW
State #31-14	NW¼NE¼	14	37 North	73 West	Sussex	POW
Ukelele #42-15	SE¼NE¼	15	37 North	73 West	Sussex	POW

**Table 3.3 - Continued**

**Producing Wells in the Hornbuckle Field**

Well Name and Number	Legal Location of Well				Producing Formation(s)	Well Status <sup>2</sup>
	Quarter	Section	Township	Range		
Reynolds Fee #21-23	NE¼NW¼	23	37 North	73 West	Sussex	POW
Reynolds State #B-23	E½SW¼	23	37 North	73 West	Sussex	POW
State #33-23	NW¼SE¼	23	37 North	73 West	Sussex	POW
State #41-23	NE¼NE¼	23	37 North	73 West	Sussex	POW
Duck Federal #13-24	NW¼SW¼	24	37 North	73 West	Sussex	POW
Federal-P #11-24	NW¼NW¼	24	37 North	73 West	Muddy	POW
State #A-25	SE¼SW¼	25	37 North	73 West	Teapot	POW
Reynolds #21-26	NE¼NW¼	26	37 North	73 West	Sussex	POW
State #B-26	NE¼SE¼	26	37 North	73 West	Sussex	POW
Buckle #24-27	SE¼SW¼	27	38 North	73 West	Sussex	POW
HR Federal #31-27H	NW¼NE¼	27	38 North	73 West	Horizontal Sussex	POW
HR Fee #11-27V	NW¼NW¼	27	38 North	73 West	Sussex	POW
Buckle #44-28	SE¼SE¼	28	38 North	73 West	Sussex	POW
Hornbuckle #28-1	NE¼SW¼	28	38 North	73 West	Sussex	POW
HR Fee #41-28V	NE¼NE¼	28	38 North	73 West	Sussex	POW
HR Federal #44-29H	SE¼SE¼	29	38 North	73 West	Horizontal Sussex	POW
Baker Fee #42-33	SE¼NE¼	33	38 North	73 West	Sussex	POW
HR Fee #21-33H	NE¼NW¼	33	38 North	73 West	Horizontal Sussex	POW
Blaylock Federal #13-35A	SE¼NE¼	34	38 North	73 West	Sussex	POW
Blaylock Fee #42-34V	SE¼NE¼	34	38 North	73 West	Sussex	POW
Highland Flats #12-34	SE¼NW¼	34	38 North	73 West	Sussex	POW
Highland Flats #14-34	SW¼SW¼	34	38 North	73 West	Sussex	POW
Highland Flats Fee #23-34	NE¼SW¼	34	38 North	73 West	Sussex	POW
Highland Flats #34-34	SW¼SE¼	34	38 North	73 West	Sussex	POW
BR Fee #11-35V	NW¼NW¼	35	38 North	73 West	Sussex	POW

1 Information from the Wyoming Oil and Gas Commission website: <http://wogcc.state.wy.us/>

2 POW = Producing Oil Well  
PGW = Producing Gas Well

### 3.4 CULTURAL RESOURCES

Cultural resource inventories have been conducted on each of the eight wells proposed in conjunction with the Proposed Action including the access road routes required for access thereto. These inventories were conducted in compliance with the *National Historic Preservation Act* (NHPA) and included all lands within the proposed project area that may be affected by surface disturbing activities associated with the construction of the individual well

locations and access road routes. A synopsis of these cultural inventories is provided in Table 3.4 and includes the project name, acres inventoried, and the number of sites recorded.

**Table 3.4**

**Results of the Cultural Resource Inventories Conducted for the Eight Horizontal Wells Proposed by SWPC in the Hornbuckle Field**

Well Name and Number	Acres Surveyed for Cultural Materials				Sites Identified	Eligible Sites
	Location	Access	Pipelines	Other		
BR Federal 44-4H	10.00	0.43	-----	-----	0	0
BR Federal 11-10H <sup>1</sup>	10.00	1.10	-----	-----	0	0
HR Federal 44-20H	10.00	10.30	-----	-----	0	0
GH Federal 44-21H	10.00	0.70	-----	-----	0	0
GH Federal 24-22H	10.00	2.00	-----	-----	0	0
DCR Federal 31-24H	10.00	12.50	-----	-----	0	0
BR Federal 24-26H	10.00	2.00	-----	-----	0	0
HR Federal #11-28	10.00	3.44	-----	-----	0	0
<b>TOTALS</b>	<b>80.00</b>	<b>32.47</b>	<b>-----</b>	<b>-----</b>	<b>0</b>	<b>0</b>

<sup>1</sup> One isolate was identified in conjunction with the inventory of the BR Federal #11-10H project.

As indicated above, no cultural sites were identified in conjunction with these inventories. Copies of the individual cultural resource inventory reports are currently on file with both the BLM’s CFO in Casper, Wyoming and the Wyoming State Historic Preservation Office (SHPO) in Laramie, Wyoming.

**3.5 INVASIVE, NON-NATIVE SPECIES**

Non-native plant species that are difficult to control, easily spread, and injurious to public health, crops, livestock, land or other property have been designated as noxious weeds under the Wyoming Weed and Pest Control Act of 1973. Prohibited noxious weeds pursuant to W.S. 11-12-104 are identified in Table 3.5.

To our knowledge, no surveys have been conducted within the Hornbuckle Field or the surrounding area to determine either the presence or absence of those noxious weeds identified in Table 3.5.

**Table 3.5**

**Invasive Non-Native Species (Noxious Weeds) <sup>1</sup>**

Common Name	Scientific Name
Field bindweed	<i>Convolvulus arvensis</i> L.
Canada thistle	<i>Cirsium arvense</i> L.
Leafy spurge	<i>Euphorbia esula</i> L.
Perennial sowthistle	<i>Sonchus arvensis</i> L.
Quackgrass	<i>Agropyron repens</i> (L.) Beauv.
Hoary cress (whitetop)	<i>Cardaria draba</i> and <i>Cardaria pubescens</i> (L.) Desv.
Perennial pepperweed (giant whitetop)	<i>Lepidium latifolium</i> L.
Ox-eye daisy	<i>Chrysanthemum leucanthemum</i> L.
Skeletonleaf bursage	<i>Franseria discolor</i> Nutt.
Russian knapweed	<i>Centaurea repens</i> L.
Yellow toadflax	<i>Linaria vulgaris</i> L.
Dalmatian toadflax	<i>Linaria dalmatica</i> (L.) Mill.
Scotch thistle	<i>Onopordum acanthium</i> L.
Musk thistle	<i>Carduus nutans</i> L.
Common burdock	<i>Arctium minus</i> (Hill) Bernh.
Plumeless thistle	<i>Carduus acanthoides</i> L.
Dyers woad	<i>Isatis tinctoria</i> L.
Houndstongue	<i>Cynoglossum officinale</i> L.
Spotted knapweed	<i>Centaurea maculosa</i> Lam.
Diffuse knapweed	<i>Centaurea diffusa</i> Lam.
Purple loosestrife	<i>Lythrum salicaria</i> L.
Saltcedar	<i>Tamaxix</i> ssp.
Common St. Johnswort	<i>Hypericum perforatum</i>
Common tansy	<i>Tanacetum vulgare</i>
Russian olive	<i>Elaeagnus angustifolia</i> L.

1 From the Wyoming Weed and Pest Council website: [www.wyoweed.org](http://www.wyoweed.org).

### 3.6 SOILS

The Powder River Basin exhibits a wide range of soils which are directly associated with the topography. Variations in soils are due to the differing origins of parent materials, different climatic conditions, and the effects of different types of vegetation. In this regard, a Third Order Soils Inventory of Converse County, Wyoming Northern Part has been published by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS 1986). As a result of this inventory, soils within the project area have been mapped and classified.

Table 3.6 provides information concerning those soil mapping units (SMUs) encountered at each individual well location and access road route proposed within the Hornbuckle Field.

**Table 3.6**

**Soil Mapping Units to be Impacted by the Proposed Action**

Well Name and Number	Affected Soil Mapping Units		
	Well Location	New Road	Reconstructed Road
BR Federal 44-4H	137	137	n/a
BR Federal 11-10H	122	122	n/a
DCR Federal 31-24H	105	149	149
HR Federal 44-20H	137	137, 149	122, 137
GH Federal 44-21H	122	122, 137	n/a
GH Federal 24-22H	121	121	117, 227
BR Federal 24-26H	109	109	n/a
HR Federal 11-28H	122	122	137

Table 3.7 provides additional information concerning the physical characteristics of each affected SMU as identified above. Additional information regarding the physical characteristics of individual soils within each of these soil mapping units may be obtained from the *Soil Survey of Converse County, Wyoming, Northern Part* published by the U.S. Department of Agriculture, Natural Resources Conservation Service in 1986 in cooperation with the U.S. Forest Service, U.S. Department of the Interior, BLM and the Wyoming Agricultural Experiment Station (NRCS 1986).

**3.7 WILDLIFE**

**3.7.1 Big Game Species**

Two big game species, pronghorn antelope (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*), inhabit the general project area. Antelope and mule deer populations residing in the area are classified within the North Converse Herd Unit, which includes antelope hunt areas 25 and 26 and deer hunt area 22. The Hornbuckle Field is specifically located within antelope hunt area 26. Herd objectives for both antelope and mule deer in the North Converse Herd Unit are 28,000 and 9,100 post hunt animals, respectively. The 2007 estimated populations for the North Converse Herd Unit were 31,028 antelope and 9,300 mule deer. Antelope populations in the North Converse Herd Unit are approximately 8% above herd objectives, while mule deer populations are approximately 2% above herd objectives. There are no crucial antelope or mule deer habitats located within the Hornbuckle Field project area (WGFD 2008).

**Table 3.7**

**Summary of the Physical Characteristics of Individual Soil Mapping Units in the Hornbuckle Field Project Area <sup>1</sup>**

Soil Map Unit #	Soil Map Unit Name	Slope Phase	Topography	Soil Series	Soil Depth	Rooting Depth	Available Water Capacity	Permeability	Runoff Potential	Water Erosion Hazard	Wind Erosion Hazard
105	Cambria-Cushman complex	6 to 15%	Back slopes of rolling hills and adjacent foot slopes	50% Cambria fine sandy loam	deep	> 60 in.	high	moderate	medium	severe	moderate
				30% Cushman loam	moderately deep	20 - 40 in.	low	moderate	medium	severe	moderate
109	Clarkelen-Haverdad-Bigwinder complex	0 to 3%	Flood plains and low terraces on major streams	35% Clarkelen sandy loam	deep	> 60 in.	moderate	mod. rapid	slow	moderate	moderate
				25% Haverdad fine sandy loam	deep	> 60 in.	moderate	moderate	slow	moderate	moderate
				25% Bigwinder fine sandy loam	deep	> 60 in.	high	moderate	slow	moderate	moderate
121	Hiland-Bowbac sandy loams	0 to 6%	Foot slopes and pediment slopes	70% Hiland sandy loam	deep	> 60 in.	moderate	moderate	slow	slight	moderate
				20% Bowbac sandy loam	moderately deep	20 - 40 in.	low	moderate	medium	moderate	moderate
122	Hiland-Bowbac complex	6 to 15%	Ridges and back slopes of rolling uplands	60% Hiland sandy clay loam	deep	> 60 in.	moderate	moderate	medium	moderate	moderate
				30% Bowbac sandy loam	mod. deep	20 - 40 in.	low	moderate	medium	moderate	moderate
136	Tassel-Terro-Rock outcrop complex <sup>2</sup>	15 to 30%	Hilly to steep areas on upland ridgetops, shoulder slopes, and back slopes	40% Tassel loamy fine sand	shallow	6 - 20 in.	very low	mod. rapid	medium	moderate	severe
				20% Terro sandy loam	moderately deep	20 - 40 in.	low	mod. rapid	slow	moderate	moderate
				20% Rock outcrop	---	---	---	---	---	---	---
137	Tassel-Tullock-Vonalee association	6 to 30%	Ridges and hill slopes in an area of rolling to steep uplands	40% Tassel loamy fine sand	shallow	6 - 20 in.	very low	mod. rapid	medium	moderate	severe
				20% Tullock loamy sand	moderately deep	20 - 40 in.	very low	rapid	medium	moderate	severe
				20% Vonalee loamy sand	deep	> 60 in.	low	mod. rapid	medium	moderate	severe
149	Worf-Shingle-Tassel complex	3 to 30%	Ridgetops and shoulder slopes of undulating to steep uplands on partially stabilized escarpments	35% Worf loamy sand	shallow	8 - 20 in.	very low	moderate	medium	moderate	severe
				30% Shingle clay loam	shallow	4 - 20 in.	low	moderate	rapid	severe	slight
				20% Tassel fine sandy loam	shallow	6 - 20 in.	very low	mod. rapid	medium	moderate	moderate

NOTES: <sup>1</sup> Information obtained from the *Soil Survey of Converse County, Wyoming, Northern Part* published ca 1986 by the United States Department of Agriculture - Natural Resources Conservation Service (NRCS 1986).

<sup>2</sup> SMU 136 - Rock outcrop consists of exposures of mostly soft, calcareous sandstone on knolls and narrow ridges.

### 3.7.2 BLM Sensitive Species

BLM sensitive species are generally those species that are in need of special management considerations. Table 3.8 contains a listing of those BLM sensitive species that may occur in Wyoming and their habitat preferences.

BLM sensitive animal and plant species potentially occurring in the Hornbuckle Field include ferruginous hawk, greater sage-grouse, sage thrasher, loggerhead shrike, Brewer's sparrow and sage sparrow. Two of these sensitive species are more likely to occur within the Hornbuckle Field than the remaining species based upon both prior observations and a review of habitat types therein. These species include ferruginous hawk and greater sage-grouse. A brief discussion of these two individual species is presented below:

- Ferruginous hawk (*Buteo regalis*). As discussed in Section 3.7.3 below, there is little information regarding historic raptor nesting activity within the overall project area. Inventories conducted in conjunction with specific project proposals have identified two historic ferruginous hawk nests in close proximity to well proposed in conjunction with the Proposed Action. Past breeding activity at these historic nests is unknown.
- Greater sage-grouse (*Centrocercus urophasianus*). Sage grouse populations in the general project area are included in Upland Game Bird Management Area 35 and declined throughout the Casper (WGFD) Region from the early 1980's through the mid-1990's, with this decline generally attributed to various forms of habitat degradation. Nonetheless, it would appear that sage grouse numbers in the Casper Region have increased slightly since 1996 (WGFD 2003).

There are no historic greater sage-grouse leks known to exist within approximately nine miles of the proposed project area (WGFD 2003). As stated in Section 3.2, the general project area is predominately a western mixed grass/short-grass prairie exhibiting a paucity of sagebrush habitats that would be considered as suitable nesting and brood-rearing habitat for greater sage grouse - which is borne out by the fact that there are no known historic leks in the general area. As there are no known leks within a five-mile radius of the Proposed Action, there will be no significant impacts to greater sage grouse breeding or nesting habitat; consequently, the species will not be discussed further in this analysis document.

### 3.7.3 Raptor Species

There has not been a comprehensive inventory of raptor nesting activity within and/or adjacent to those lands included within the Hornbuckle Field. Individual inventories have been conducted on a case-by-case basis in response to both past and present activities proposed by SWPC and other operators in the Hornbuckle Field, but these inventories were generally limited to an inventory of historic nests located within a one-half mile radius of each proposed well location and access road route.

**Table 3.8**

**Wyoming BLM Sensitive Species and Habitat Preferences**

Species		Preferred Habitat	Likely to Occur <sup>1</sup>
Common Name	Scientific Name		
<b>MAMMALS</b>			
Long-eared Myotis	<i>Myotis evotis</i>	Conifer and deciduous forests, caves and mines	N
Fringed Myotis	<i>Myotis thysanodess</i>	Conifer forests, woodland-chaparral, caves and mines	N
Spotted Bat	<i>Euderma maculatum</i>	Cliffs over perennial water, basin-prairie shrub	N
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	Forests, basin-prairie shrub, caves and mines	N
White-tailed Prairie Dog	<i>Cynomys leucurus</i>	Basin-prairie shrub, grasslands	N
Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	Basin-prairie shrub, grasslands	N
Swift Fox	<i>Vulpes velox</i>	Grasslands	N
Preble's Meadow Jumping Mouse	<i>Zapus hudsonicus preblei</i>	Riparian habitats along the southern Rocky Mountain front	N
<b>BIRDS</b>			
White-faced Ibis	<i>Plegadis chihi</i>	Marshes, wet meadows	N
Trumpeter Swan	<i>Cygnus buccinator</i>	Lakes, ponds, rivers	N
Bald eagle	<i>Haliaeetus leucocephalus</i>	Conifer and deciduous forests, trees, grasslands	N
Northern Goshawk	<i>Accipiter gentilis</i>	Conifer and deciduous forests	N
Ferruginous Hawk	<i>Buteo regalis</i>	Basin-prairie shrub, grassland, rock outcrops	Y
Peregrine Falcon	<i>Falco peregrinus</i>	Tall cliffs	N
Greater Sage-grouse	<i>Centrocercus urophasianus</i>	Basin-prairie shrub, mountain-foothill shrub	Y
Long-billed Curlew	<i>Numenius americanus</i>	Grasslands, plains, foothills, wet meadows	N
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Open woodlands, streamside willow and alder groves	N
Burrowing Owl	<i>Athene cunicularia</i>	Grasslands, basin-prairie shrub	N
Sage Thrasher	<i>Oreoscoptes montanus</i>	Basin-prairie shrub, mountain-foothill shrub	Y
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Basin-prairie shrub, mountain-foothill shrub	Y
Brewer's Sparrow	<i>Spizella breweri</i>	Basin-prairie shrub	Y
Sage sparrow	<i>Amphispiza billineata</i>	Basin-prairie shrub, mountain-foothill shrub	Y
Baird's Sparrow	<i>Ammodramus bairdii</i>	Grasslands, weedy fields	N
Mountain Plover	<i>Charadrius montanus</i>	Shortgrass, great basin-foothills grassland, and sagebrush-grasslands	N
<b>AMPHIBIANS</b>			
Northern Leopard Frog	<i>Rana pipiens</i>	Beaver ponds, permanent water in plains and foothills	N
<b>PLANTS</b>			
Laramie Columbine	<i>Aquilegia laramiensis</i>	Crevices of granite boulders and cliffs 6,400-8,000'	N
Porter's Sagebrush	<i>Artemesia porteri</i>	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes; 5,300 to 6,500 feet	N
Many-stemmed Spider Flower	<i>Cleome multicaulis</i>	Semi-moist, open saline banks of shallow ponds, lakes with Baltic rush and bulrush, 5,900 feet	N
Williams' Wafer Parsnip	<i>Cymopterus williamsii</i>	Open ridge tops & upper slopes with exposed limestone outcrops or rockslides, 6,000 to 8,300 feet	N
Laramie False Sagebrush	<i>Sphaeromeria simplex</i>	Cushion plant communities on rocky limestone ridges & gentle slopes, 7,500 to 8,600 feet	N

<sup>1</sup> Key: Y = Likely to occur in or in the vicinity of the Hornbuckle Field based on habitat.  
 N = Not likely to occur in or in the vicinity of the WCU Pilot Project area based on habitat .

In this regard, a previously unrecorded ferruginous hawk nest was discovered on October 22, 2008 directly north of the DCR Federal #31-24H well location in conjunction with the on-site inspection thereon. The nest is located approximately in the SW<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub> of Section 13 in Township 37 North, Range 73 West approximately 500 feet north/northwest of the proposed well location. Nesting activity at this nest in past years is unknown. Additional raptor nests known to occur within the project area include the following:

- Ferruginous hawk nest located in the SE<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub> of Section 21 in Township 38 North, Range 73 West or approximately 0.25 mile east/northeast of the proposed HR Federal #11-28H well location (the nest is also less than 0.5 miles from the proposed HR 44-21H well location and less than 0.5 miles from the proposed access road route to the proposed HR Federal #44-20 well location); and
- Red-tailed hawk (*Buteo jamaicensis*) nest located in the NW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub> of Section 35 in Township 38 North, Range 73 West or approximately 0.25 mile southwest of the proposed BR Federal #24-26H well location.

### 3.7.4 Threatened and Endangered Species

Threatened and/or endangered (T/E) species include those species which are in danger of extinction due to habitat degradation and drastic population declines and which have subsequently been listed as threatened or endangered pursuant to the *Endangered Species Act* (ESA) of 1973 (as amended). Those T/E species which may potentially occur within the general area (BLM 2006, BLM 2008a, BLM 2008b) include:

- Black-footed ferret (*Mustela nigripes*) - Status: Endangered.
- Preble's meadow jumping mouse (*Zapus hudsonius preblei*) - Status: Threatened.
- Ute ladies'-tresses (*Spiranthes diluvialis*) - Status: Threatened.
- North Platte River Species (those species which may occur in the downstream riverine habitats of the North Platte River in Nebraska and that could be adversely affected by water depletions in the North Platte River system resulting from project-related activities) including:
  - 1) Interior least tern (*Sterna antillarum*) - Status: Endangered;
  - 2) Piping plover (*Charadrium melodus*) - Status: Threatened;
  - 3) Pallid sturgeon (*Scaphirhynchus albus*) - Status: Endangered;
  - 4) Eskimo curlew (*Numenius borealis*) - Status: Endangered; and
  - 5) Western prairie fringed orchid (*Platanthera praeclara*) - Status: Threatened.

### 3.7.5 Migratory Bird Species

Habitats in the Hornbuckle Field area are primarily sagebrush-dominated uplands (shrub-steppe) with interspersed shortgrass prairie. Wyoming Partners in Flight (PIF) priority species potentially occurring in the shrub-steppe (SS) and shortgrass prairie (SGP) habitat types are listed in Table 3.9 (Nicholoff 2003).

The Hornbuckle Field lies in an area directly south of latitude 43°10'00"N and directly east of longitude 105°40'00"W. Species distribution as reported in *The Atlas of Birds, Mammals, Reptiles and Amphibians in Wyoming* (WGFD 1999) includes a compilation of observations mapped by latitude and longitude, with the State of Wyoming divided into 28 different regions, where these observations are reported within a specific region of the state. These regions are based upon a one degree separation of both latitude and longitude. As a consequence, the Hornbuckle Field falls with Wyoming Distribution Area (latilongs) 13 as defined by WGFD (1999). Avian distribution data for the PIF priority species potentially occurring within the Hornbuckle Field is included in Table 3.9. Only those birds that have been classified by WGFD (1999) as confirmed breeders (nest and/or young observed), with circumstantial evidence of breeding (nest and/or young not located), or that have been observed at any time (season) within the general area (but without any evidence of breeding) are included in the list. Breeding Bird Survey (BBS) data for survey routes within Wyoming were included in this database (WGFD 1999).

Most of the birds listed in Table 3.9 typically nest either on the ground or in shrubs; thus activities associated with the Proposed Action may have the potential to destroy individual nests, eggs, and/or young of some of these species. Projected losses are indeterminate as there are no Breeding Bird Survey (BBS) routes located within the immediate vicinity of the Hornbuckle Field which could provide information on breeding bird densities within the shrub-steppe and shortgrass prairie habitats encountered within the overall project area. Concerns regarding the decline of both migratory and non-migratory bird populations both locally and on a continental scale have resulted in a nationwide bird conservation planning effort. Management goals and objectives for bird conservation are found in the following documents:

- 1) Land Bird Strategic Plan;
- 2) Presidential Executive Order (EO) 13186 dated January 17, 2001; and
- 3) Proposed Memorandum of Understanding associated with the above Presidential EO.

Bird Conservation Plans prepared at the state and regional levels also include objectives for bird conservation. As evidenced by EO 13186, there has been national direction to implement actions that incorporate these goals.

**Table 3.9**

**List of Partners In Flight (PIF) Priority Bird Species  
Potentially Found Within the Hornbuckle Field Project Area**

Common Name	Scientific Name	Habitat Type	Distribution Area <sup>1</sup>
-------------	-----------------	--------------	--------------------------------

**Level I Species** (Conservation Action)

Ferruginous Hawk	<i>Buteo regalis</i>	SS/SGP	B
Greater Sage Grouse	<i>Centrocercus urophasianus</i>	SS	B
Mountain Plover	<i>Charadrius montanus</i>	SS/SGP	B
Upland Sandpiper	<i>Bartramia longicauda</i>	SGP	B
Long-billed Curlew	<i>Numenius Americana</i>	SGP	O
Burrowing Owl	<i>Athene cunicularia</i>	SGP	B
Short-eared Owl	<i>Asio flammeus</i>	SGP	B
Baird's Sparrow	<i>Ammodramus bairdii</i>	SGP	b
Brewer's Sparrow	<i>Spizella breweri</i>	SS	B
Sage Sparrow	<i>Amphispiza belli</i>	SS	B
McCown's Longspur	<i>Calcarius mccownii</i>	SS/SGP	B

**Level II Species** (Monitoring)

Black-chinned Hummingbird	<i>Archilochus alexandri</i>	SS	N
Loggerhead Shrike	<i>Lanius ludovicianus</i>	SS	B
Sage Thrasher	<i>Oreoscoptes montanus</i>	SS	B
Vesper Sparrow	<i>Pooecetes gramineus</i>	SS	B
Lark Sparrow	<i>Chondestes grammacus</i>	SS	B
Lark Bunting	<i>Calamospiza melanocorys</i>	SGP	B
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	SGP	B
Dickcissel	<i>Spiza Americana</i>	SGP	O
Bobolink	<i>Dolichonyx oryzivorus</i>	SGP	O

**Level III Species** (Local Interest)

Common Poorwill	<i>Phalaenoptilus nuttallii</i>	SS	b
Say's Phoebe	<i>Sayornis saya</i>	SS	B

1 Definitions for those symbols used to report Wyoming avian distribution are as follows:

B: Nest or young dependent upon parent birds observed.

b: Circumstantial evidence of breeding.

O: The species has been observed, but there was no evidence of nesting.

N: The species has not been observed in the area.

### **3.8 ENVIRONMENTAL JUSTICE**

Neither the Proposed Action nor the No Action Alternative would disproportionately affect minority or low income people, and is not discussed further in this EA. The proposed project would provide some additional employment opportunities for a small number of workers in Converse County, thereby contributing to the local economy.