

Environmental Assessment
for
SAMSON RESOURCES COMPANY
SCOTT FIELD DEVELOPMENT PROJECT

Bureau of Land Management
Casper Field Office
Casper, Wyoming

WY-060-EA13-067

September 2013



The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

BLM/WY/PL-13/037+1310

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Appendix B Scott Field Federal Oil and Gas Lessees of Record

Appendix C Public Comments and Responses

LIST OF ACRONYMS

AAM	Annual Arithmetic Mean
ACHP	Advisory Council on Historic Preservation
AHW	Alliance for Historic Wyoming
AIRFA	American Indian Religious Freedom Act
APD	Application for Permit to Drill
Ac-Ft	Acre-Feet
APLIC	Avian Power Line Interaction Committee
AQD	Air Quality Division
AQRV	Air Quality Related Values
AQS	Air Quality System
AST	Above Ground Storage Tank
BACT	Best Available Control Technology
bb1(s)	Barrel(s) (42 U.S. gallons)
BLM	Bureau of Land Management
BMP	Best Management Practices
CAA	Clean Air Act
CBNG	Coal Bed Natural Gas
CCS	Center for Climate Strategies
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CEQ	Council on Environmental Quality
CFO	Casper Field Office
CFR	Code of Federal Regulations
CH ₄	Methane
CIA	Cumulative Impacts Area
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CO ₂ e	Equivalent CO ₂
COA	Condition of Approval
CWA	Clean Water Act of 1972
dBA	A-weighted Decibel
DR	Decision Record
DOT	Department of Transportation
dv	Deciview
EA	Environmental Assessment
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know
ESA	Endangered Species Act
FLPMA	Federal Land Policy Management Act
FONSI	Finding of No Significant Impact
GEIS	Generic Environmental Impact Statement
GHG	Greenhouse Gas

LIST OF ACRONYMS (Continued)

GIS	Geographical Information System
HF	Hydraulic Fracturing
HFC	Hydrofluorocarbon
hp	Horsepower
HUC	Hydrologic Unit Code
HWA	Hayden-Wing Associates, LLC
IM	Instruction Memorandum
JCU	Jackson Candle Unit
LACT	Lease Automatic Custody Transfer
MBTA	Migratory Bird Treaty Act
mg/L	Milligrams per Liter
µg/m ³	Microgram per Cubic Meter
MLA	Mineral Leasing Act of 1920
MMt	Million Metric Tons
MSUP	Master Surface Use Plan
NAGPRA	Native American Graves Protection and Repatriation Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOS	Notice of Staking
NO _x	Oxides of Nitrogen
N ₂ O	Nitrous Oxide
NO ₂	Nitrogen Dioxide
NRC	Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
O ₃	Ozone
OBM	Oil Based Mud
OSHA	Occupational Safety and Health Administration
PAW	Petroleum Association of Wyoming
PFC	Perfluorocarbon
PFYC	Potential Fossil Yield Classification
P.L.	Public Law
POD	Plan of Development
PPM	Parts Per Million
RCRA	Resource Conservation and Recovery Act
RFFA	Reasonably Foreseeable Future Actions
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-Way
SARA	Superfund Amendment and Reauthorization Act
SDWA	Safe Drinking Water Act

LIST OF ACRONYMS (Continued)

SFD	Scott Field Development
SF ₆	Sulfur Hexafluoride
SH	State Highway
SHPO	State Historic Preservation Officer
SLAMS	State and Local Air Monitoring Site
SO ₂	Sulfur Dioxide
SPCC	Spill Prevention, Control, and Countermeasures
SPM	Special Purpose Monitors
SRC	Samson Resources Company
SU	Standard Unit
TBG PEA	Thunder Basin Grassland Prairie Ecosystem Association
TD	Total Depth
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers
USDI	U.S. Department of the Interior
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VRM	Visual Resource Management
WAAQS	Wyoming Ambient Air Quality Standards
WDEQ	Wyoming Department of Environmental Quality
WGFD	Wyoming Game and Fish Department
WOGCC	Wyoming Oil and Gas Conservation Commission
WOS	Wildlife Observation System
WPIF	Wyoming Partners in Flight
W.S.	Wyoming Statute
WSEO	Wyoming State Engineer's Office
WQD	Water Quality Division
WWC	WWC Engineering
WYDOT	Wyoming Department of Transportation
WY-GAP	Wyoming Gap Analysis Project
WYNDD	Wyoming Natural Diversity Database
WYPDES	Wyoming Pollutant Discharge Elimination System

1.0 INTRODUCTION

This environmental assessment (EA) is prepared pursuant to the National Environmental Policy Act (NEPA) as amended (42 USC Chapter 55, §4321 *et seq.*), and its implementing regulations found in Title 40 CFR, Parts 1500-1508 and the Bureau of Land Management's (BLM's) National Environmental Policy Act Handbook (BLM 2008). As described in the National Environmental Policy Act Handbook, a proposal involving mineral estate submitted to the BLM triggers the NEPA process when the BLM manages the surface and the subsurface resources or in the case of split estate (BLM manages the subsurface resources only and the surface is non-federal or when the BLM manages the surface and the subsurface resources are non-federal) (BLM 2008). For the purposes of this document, the BLM's connection is referred to as a federal nexus. This EA assesses the environmental impacts of the Proposed Action and the No Action Alternative and serves to guide the decision-making process.

1.1 Background

Samson Resources Company (SRC) has notified the Casper Field Office (CFO), BLM of its desire to further develop oil and gas resources within an area including the existing Scott Field in Converse County, Wyoming, approximately 20 miles north of the town of Douglas, in Townships 35 and 36 North, Ranges 71 and 72 West. The proposed project is within an existing oil field that has been extensively developed. The project general location and the Scott Field Development (SFD) project area are depicted on Figure 1-1.

The SFD project area encompasses approximately 44,619 acres (68 sections) of mixed surface estate with federal, state, and fee (private) surface lands. Of this total, approximately 1,551 acres (3.5 percent) are owned by the United States and administered by the BLM, 2,429 acres (5.4 percent) are owned by the State of Wyoming, and the remaining 40,639 acres (91.1 percent) are owned by private individuals. Table 1-1 summarizes surface ownership within the SFD project area. Approximately 25,959 acres (58.2 percent) of the mineral estate are federal, 2,919 acres (6.5 percent) are state, and 15,741 acres (35.3 percent) are fee. Table 1-2 summarizes the mineral ownership within the project area. Surface ownership is depicted on Figure 1-2, and mineral ownership is depicted on Figure 1-3.

1.2 Purpose of and Need for the Proposed Action

The purpose of the action is to explore for and develop oil and gas resources on federal mineral leases consistent with lease rights where valid, existing rights occur.

The need for exploration and development of oil and gas resources is established by the BLM's responsibility under the Mineral Leasing Act of 1920 (30 U.S.C.181 *et seq.*) (MLA) as amended to promote the mining of oil and gas on the public domain. Deposits of oil and gas owned by the United States are subject to disposition in the form and manner provided by the MLA, where applicable through the land use planning process.

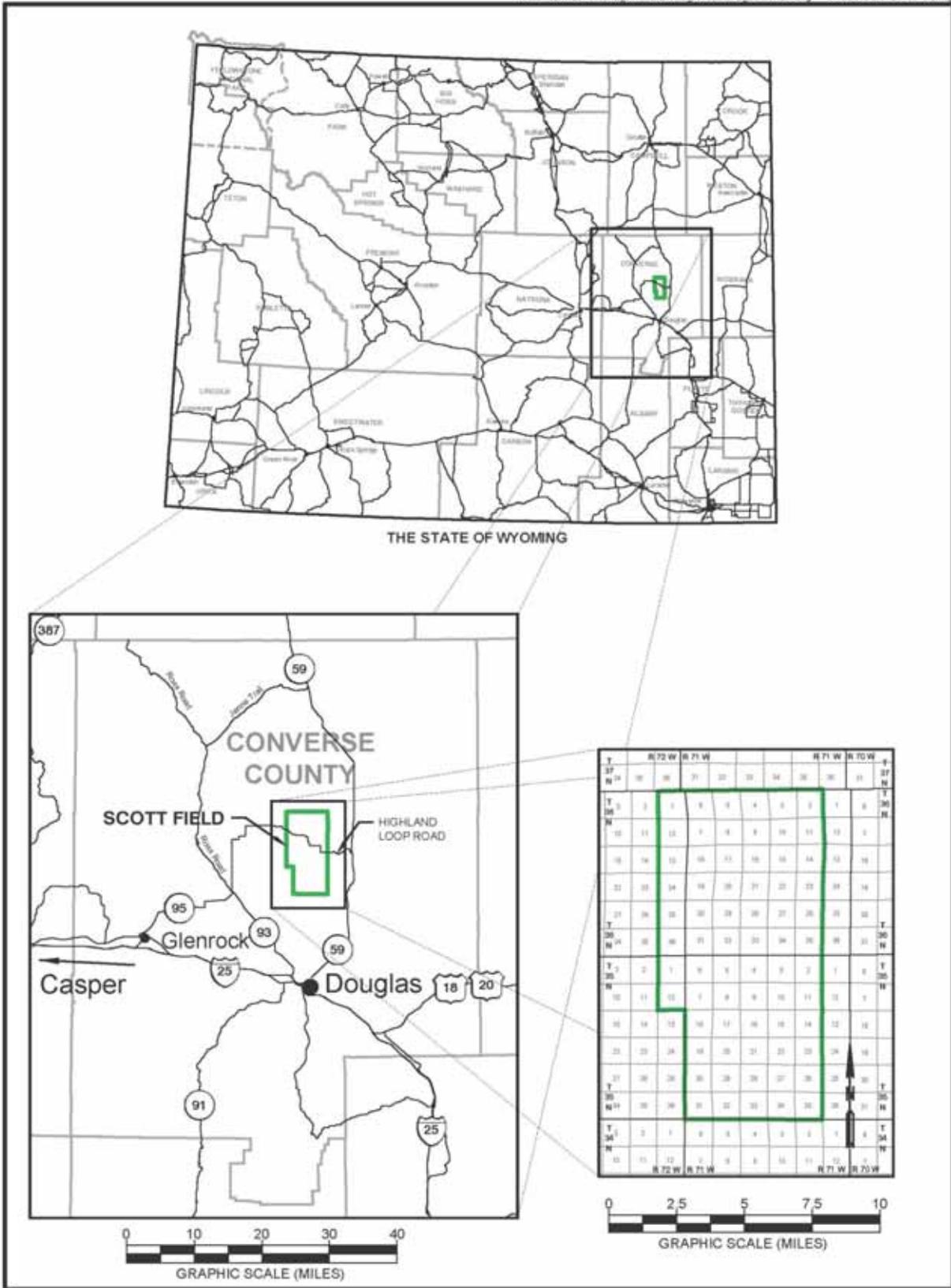


Figure 1-1. SFD Project Area Vicinity Map

Table 1-1. Surface Ownership within the SFD Project Area

Surface Ownership	Acres	Percent of Total
Federal – Administered by BLM	1,551	3.48
State of Wyoming	2,429	5.44
Private (Fee)	40,639	91.08
Total	44,619	100.00

Table 1-2. Mineral Ownership within the SFD Project Area

Mineral Ownership	Acres	Percent of Total
Federal	25,959	58.18
State of Wyoming	2,919	6.54
Private (Fee)	15,741	35.28
Total	44,619	100.00

1.3 Decision to be Made

The BLM will decide whether or not to authorize the development, production, maintenance, and reclamation of oil and gas resources on the federal mineral leases within the SFD project area and if so, under what terms and conditions.

If the analysis contained in this EA demonstrates no significant impacts resulting from the Proposed Action, the BLM would issue a Finding of No Significant Impact (FONSI) and a Decision Record (DR) that documents the selected alternative and any accompanying mitigation measures. Following the issuance of the FONSI, the BLM must review and authorize site-specific surface-disturbance activities. This is normally accomplished using an Application for Permit to Drill (APD) or right-of-way (ROW) grant, with a supporting environmental record of review. The site-specific review and analysis are required before any additional construction could occur.

1.4 Relationship to Statutes, Regulations, Plans or Other Environmental Analyses

Pursuant to 40 CFR 1508.28 and 1502.21, this EA tiers to and incorporates by reference the information and analysis contained in the *Record of Decision and Approved Casper Resource Management Plan* (Casper RMP) approved in December 2007, including FEIS and any amendments, and the Highland Loop Road Exploratory Oil and Gas EA (Highland Loop EA) (WY-060-EA12-226), approved in November 2012.

This EA has been prepared in accordance with NEPA and is in compliance with all applicable regulations and laws subsequently passed, including the Council on Environmental Quality (CEQ) regulations (40 CFR, Parts 1500-1508); U.S. Department of the Interior (USDI) requirements contained in Department Manual 516, Environmental Quality (USDI 1980); guidelines listed in the BLM Manual Handbook, H-1790-1 (BLM 2008); Guidelines for Assessing and Documenting Cumulative Impacts (BLM 1994); Washington Office Instruction Memorandum (IM) 2005-247 - National Environmental Policy Act Compliance for Oil, Gas, and Geothermal Development

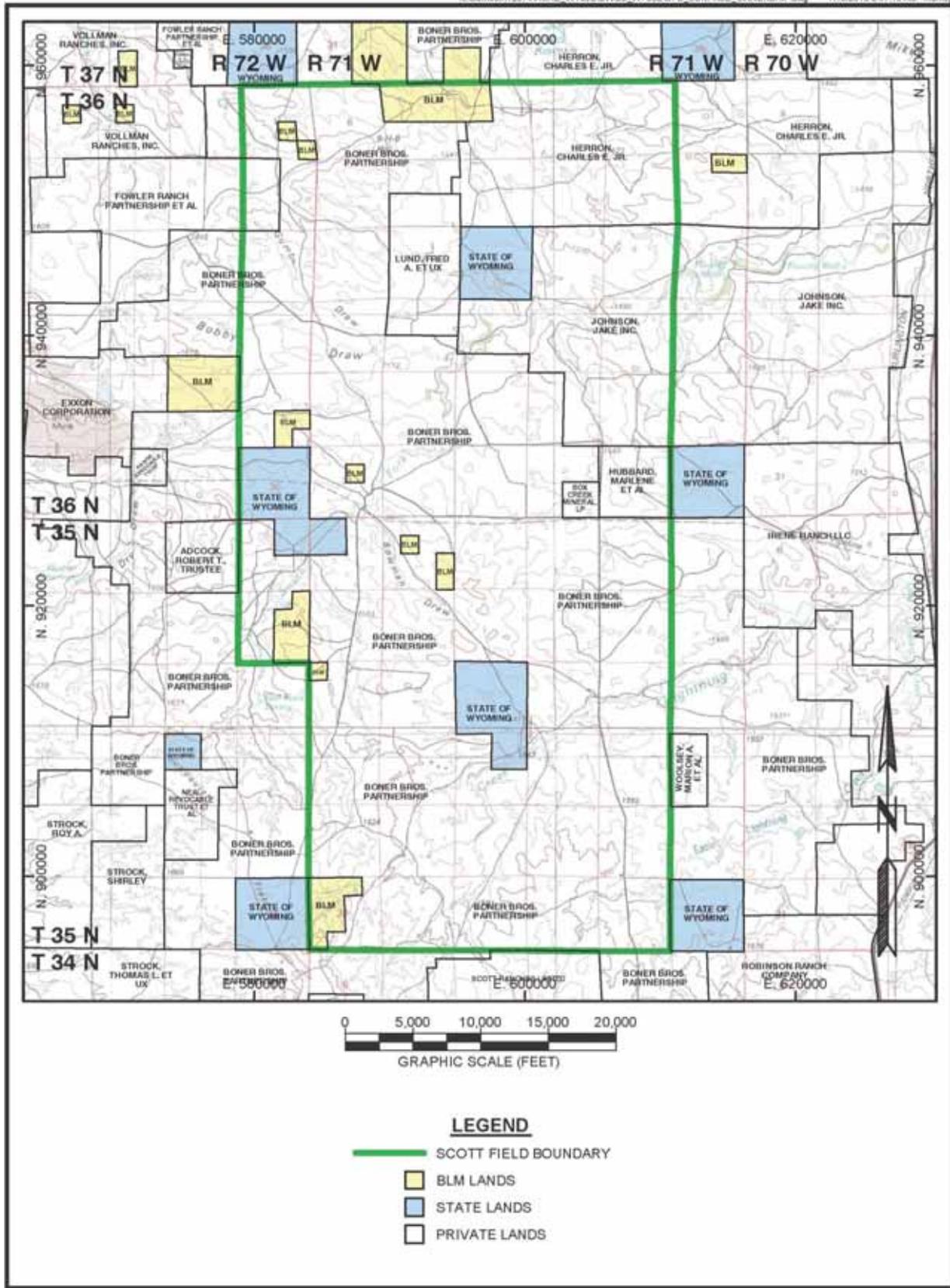


Figure 1-2. SFD Project Area Surface Ownership

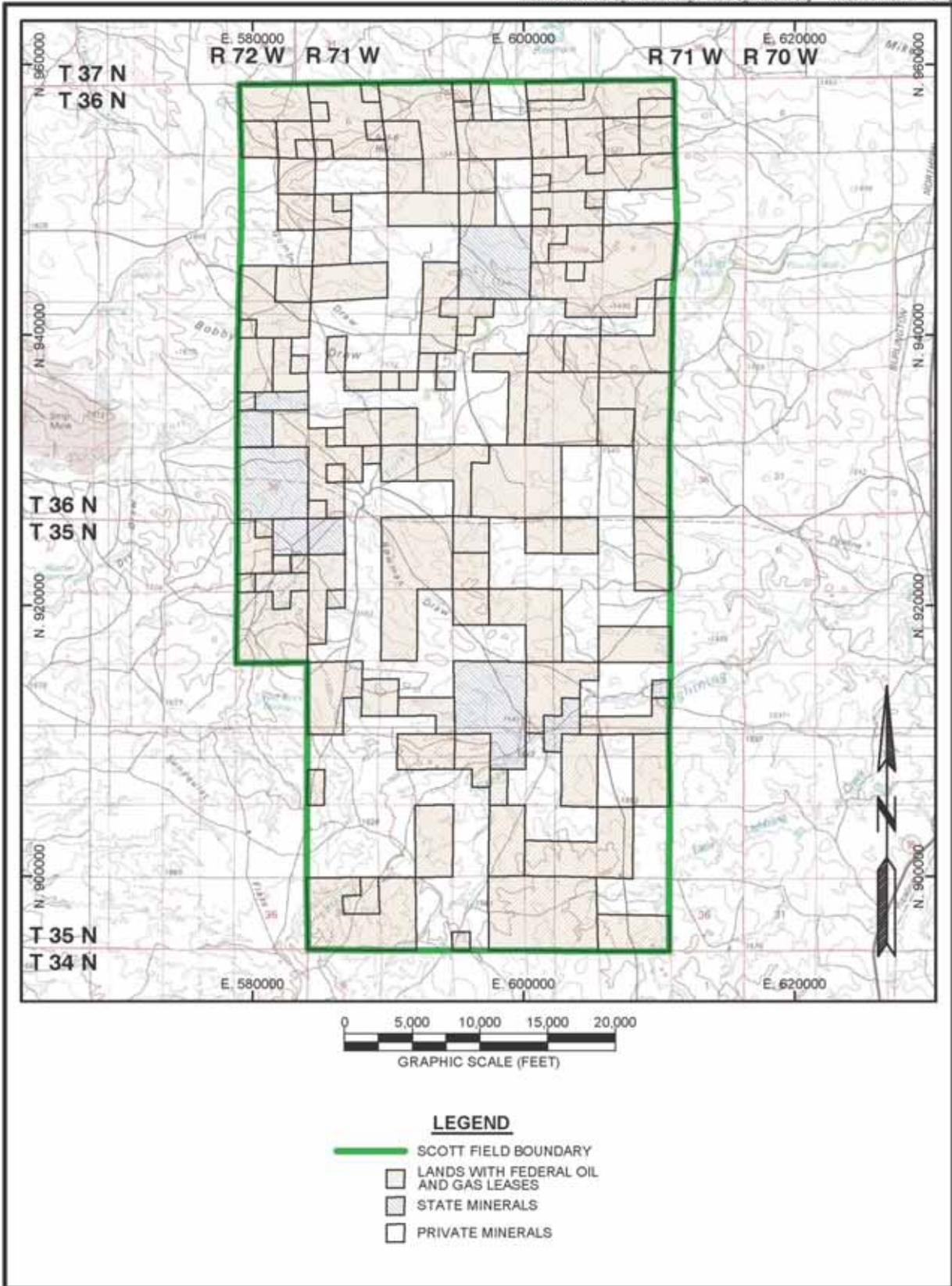


Figure 1-3. SFD Project Area Mineral Ownership

(BLM 2005); CEQs Considering Cumulative Effects under the National Environmental Policy Act (CEQ 1997); and the Energy Policy Act of 2005.

BLM planning for the project area is documented in the Casper RMP, which established the following objectives for managing leasable minerals:

- MR: 2.1 - Maintain oil and gas leasing, exploration, and development, while minimizing impacts to other resource values;
- MR: 2.4 - Facilitate the evaluation of public lands for oil and gas potential; and
- MR: 3.1 - Maintain opportunities to explore and develop federal oil and gas resources and other leasable minerals.

Oil and gas leases on federal mineral estate are issued by the BLM consistent with regulations regarding federal oil and gas leasing and operations (43 CFR, Parts 3100 and 3160, respectively). Stipulations may be added as terms of a lease when the lease is issued to reflect management actions established in the Casper RMP.

Once a lease is issued, the leaseholder/operator must apply for and receive site-specific authorization(s) prior to drilling within the leasehold area. To meet required environmental obligations, the leaseholder/operator must submit to the BLM an APD and/or ROW application so that the appropriate site-specific environmental review may be conducted. Environmental documents such as an Environmental Assessment, Determination of NEPA Adequacy, or Categorical Exclusion would be prepared and site-specific resource protection measures and mitigation as Conditions of Approval (COAs) would be placed on the APD approval or as Terms of Agreement on a ROW grant.

The proposed project would comply with all applicable federal, state, and local laws, plans, and permits required for this activity. Table 1-3 summarizes other relevant authorities, guidance, and permits that may apply, depending on the location of the action and the regulatory authority.

In accordance with 43 CFR, §1610.5-3(a), the Proposed Action has been determined to be in conformance with the Casper RMP. Federal minerals within the SFD project area have been leased for oil and gas extraction, and the proposed exploration and development are consistent with the land use decisions and resource management goals and objectives, with mitigation measures incorporated to reduce impacts to other resource values.

1.5 Scoping, Public Involvement, and Issues

The Scott Field is an existing oil field with 252 existing wells, dating back to the early 1980's. In addition, the SFD project area is located entirely within the Highland Loop EA boundary.

Comments have been solicited for the development of oil and gas resources on federal mineral leases for areas within and surrounding the proposed project area multiple times within the past 2 years. Oil and gas development in the area includes in-field development with the Original Hornbuckle EA in August of 2011 and exploratory development associated with the Converse County EA's in September 2012.

Table 1-3. Major Laws, Regulations, and Permits that May Apply for the Scott Field Development Project

Agency	Permit, Approval, or Action	Authority
Bureau of Land Management	Oil and Gas Leasing: <i>Federal regulations governing oil and gas leasing</i>	Mineral Leasing Act of 1920 (30 USC 181 <i>et seq.</i>); 43 CFR Part 3100
	Permit to Drill, Deepen or Plug Back (APD Process): <i>Controls drilling for oil and gas on federal onshore lands</i>	Mineral Leasing Act of 1920 (30 USC 181 <i>et seq.</i>); 43 CFR Subpart 3162
	Right-of-Way grants and temporary use permits: <i>Issue right-of-way grants on BLM managed lands</i>	Mineral Leasing Act of 1920 (30 USC 185); 43 CFR, Parts 2800 & 2880; FLPMA (43 USC 1761-1771)
	Antiquities, Cultural, and Historic Resources Permits: <i>Issue antiquities and cultural resources use permits to inventory, excavate or remove cultural or historic resources from BLM managed lands</i>	Antiquities Act of 1906 (16 USC 431- 433); Archaeological Resources Public Protection Act of 1979 (16 USC 470aa – 470ll); Preservation of American Antiquities (43 CFR, Part 3); National Historic Preservation Act (NHPA) Section 106 (36 CFR, Part 800)
	Approval to Dispose of Produced Water: <i>Controls disposal of produced water from federal leases</i>	Mineral Leasing Act of 1920 (30 USC 181 <i>et seq.</i>); 43 CFR Subpart 3164; Onshore Oil and Gas Order No. 7
U.S. Fish and Wildlife Service (USFWS)	<i>Protects federally listed threatened and endangered species through coordination and consultation process</i>	Section 7 of the Endangered Species Act (ESA) of 1973, as amended (Public Law [P.L.] 93-205)
	<i>Determine compliance through internal review or external review with the USFWS</i>	Migratory Bird Treaty Act (MBTA) of 1918, as amended; Bald and Golden Eagle Protection Act of 1940
U.S. Army Corps of Engineers (USACE)	Section 404 Permit (Nationwide and Individual): <i>Controls discharge of dredged or fill materials into waters of the United States</i>	Section 404 of the Clean Water Act of 1972 (CWA)
Wyoming Department of Agriculture	<i>Controls introduction and spread of weeds and pests</i>	Wyoming Weed and Pest Control Act (Wyoming Statute WS 11-5-102)
Wyoming Department of Environmental Quality (WDEQ) -Air Quality Division (AQD)	Permits to construct and operate certain emissions sources	Clean Air Act (CAA) of 1990 and implementing regulations in 40 CFR, Part 70; Wyoming Environmental Quality Act (WS 35-11-201 through 35- 1-21)

Table 1-3. Major Laws, Regulations, and Permits that May Apply for the SRC Scott Field Development EA Project (continued)

WDEQ – Water Quality Division (WQD)	Wyoming Pollutant Discharge Elimination System (WYPDES) Permit: <i>Controls offsite storm water runoff from construction activities resulting in 1 acre or more of disturbance and any discharges to “waters of the State”.</i>	Wyoming Environmental Quality Act; Section 405 of the CWA (40 CFR, Parts 122, 123, and 124); WDEQ Water Quality Rules and Regulations, Chapters 1, 2, and 18
Wyoming Oil and Gas Conservation Commission (WOGCC)	Permit to drill, deepen, or plug back (APD process): <i>Regulates drilling of oil and gas wells in the state</i>	WOGCC Regulations Chapter 3, Section 8 WS 30-5-104 (d)(i)(C); WS 30-5-115
	Well location (part of the APD process): <i>Regulates downhole well location of all oil and gas wells by reservoir or pool</i>	WOGCC Rule: Chapter 3, Section 2; WS 30-5-109
	Protection of surface waters and productive formations (part of APD process): <i>Provides general drilling, casing, and cementing rules for oil and gas wells</i>	WOGCC Rule: Chapter 3, Section 22
	Well control (part of APD requirements for blowout process): <i>Provides requirements for blowout preventers</i>	WOGCC Rule: Chapter 3, Section 23
	Authorization approving drilling and spacing units: <i>Regulates well spacing and pooling of interests by reservoir or pool</i>	WS 30-5-104(d)(ii)(F)(iv); WS 30-5-109(a),(b),(c) and (f)
	Permit to drill to a nonstandard Location: <i>Provides for well relocation while maintaining existing well spacing</i>	WOGCC Rule: Chapter 3, Section 3; WS 30-5-109,
	Permit to directionally drill: <i>Provides the notification requirements for controlled directional drilling</i>	WOGCC Rule: Chapter 3, Section 25
	Plugging and abandonment of a well (applies to non-federal lands): <i>Provides procedures and regulates the plugging and abandonment of oil and gas wells</i>	WOGCC Rule: Chapter 3, Section 18, Chapter 4, Section 2; WS 30-5-104(d)(vi)(B)
	Measurement of oil and gas production: <i>Regulates the measurement and reporting of oil and gas production</i>	WOGCC Rule: Chapter 3, Sections 30 and 31; WS 30-5-104 (d)(vi)(B)
	Permit to complete a well in multiple zones or pools (commingling): <i>Regulates the production of oil and gas from more than one pool in one well</i>	WOGCC Rule: Chapter 3, Section 35
	Authorization to flare or vent: <i>Regulates the safe venting or flaring of gas to prevent waste</i>	WOGCC Rule: Chapter 3, Section 40
Permit to use an earthen pit (applies to nonfederal lands): <i>Regulates construction, use and closure of noncommercial reserve, production and emergency pits on drilling and producing locations</i>	WOGCC Rule: Chapter 4, Section 1; WS 30-5-104(d)(vi)(A)	

Table 1-3. Major Laws, Regulations, and Permits that May Apply for the SRC Scott Field Development EA Project (continued)

Wyoming Oil and Gas Conservation Commission	Spills and fires: <i>Requires notification, with a prevention and cleanup plan, of accidental deaths, fires, or releases of 10 or more barrels of non-potable fluids that enter or threaten the waters of the State</i>	WOGCC Rule: Chapter 4, Section 3
	Workmanlike operations: <i>Regulates environmental protection of well facilities</i>	WOGCC Chapter 4, Section 4
	Permit underground disposal of water: <i>Regulates the noncommercial underground disposal of non-potable water and oil field wastes</i>	WOGCC Chapter 4, Section 5; WS 30-5-104 (d)(vi)(B)
	Permit to close a natural gas processing facility: <i>Regulates closure of infield gas gathering and processing facilities</i>	WOGCC Rule: Chapter 4, Section 13 (b)
Wyoming State Historic Preservation Office (SHPO)	<i>Cultural resource protection</i>	NHPA and Advisory Council Regulations (36 CFR, Part 800)
Wyoming State Engineer (WSEO)	Water well permit: <i>Issue permit to appropriate groundwater</i>	WS 41-3-938
Converse County	Compliance with the International Fire Code	WS 35-9-121
	Construction/Use Permit: <i>Ensure all structures comply the health, safety and welfare standards of Converse County Development Code</i>	WS 18-5-201 <i>et seq</i>
	Zone Change: <i>If necessary, to ensure that the proposed use of the land is coordinated with the Converse County Zoning Map and Land Use Plan</i>	WS 18-5-201 <i>et seq.</i> and 9-8-301 <i>et seq.</i>
	County Road Permits and Licenses including road access and road crossings	WS 24-3-101 <i>et seq.</i>
	Coordination with Converse County Engineering Department regarding movement of heavy equipment on county roads and the proper use and maintenance of said roads	WS 24-3-101 <i>et seq.</i>
Agency	Permit, Approval, or Action	Authority
Converse County Office of Special Projects	Small wastewater permits	WS 35-11-101 <i>et seq.</i>
Converse County Weed and Pest District	Control of Noxious Weeds	WS 11-5-101 <i>et seq.</i>
Local Emergency Planning Committee	Hazardous Materials Inventory: <i>To ensure the storage of the hazardous materials is properly coordinated with emergency providers</i>	Emergency Planning and Community Right-to-Know (EPCRA) 42 USC 116

The Hornbuckle EA analyzed 96 wells on 48 well pads within the Hornbuckle oil field, located north of the project area and adjacent to the Highland Loop EA. During the 30-day comment period only two comments were received, neither of which were substantive nor objected to the project.

The three Converse County EA's, (WY-060-EA12-225 Spearhead Ranch [BLM 2012g], WY-060-EA12-226 Highland Loop Road [BLM 2012b], and WY-060-EA12-227 East Converse [BLM 2012d]) analyzed the effects of exploratory oil and gas development of a combined total of 111 well pads with a range of 111 to 444 wells within three distinct project areas within Converse County and a small portion of Niobrara County, Wyoming. Specifically, the Highland Loop EA analyzed 37 well locations with a range of 37 to 148 wells. During the 30-day comment period, 12 comment letters were received. Of the 12 comment letters the BLM received, four were written by private citizens, one by a federal agency, one by a state agency, one by a county agency, four were from groups or associations (Thunder Basin Grasslands Prairie Ecosystem Association [TGB PEA], Petroleum Association of Wyoming [PAW], Powder River Basin Resource Council [PRBRC], Alliance for Historic Wyoming [AHW]), and three were from industry representatives. The comments, BLM's responses, and errata for tracking edits to all three EAs are contained in the document Converse County EAs Comment Response and Errata as an attendant document and incorporated as part of the decision record for the Highland Loop EA.

Due to the nature, scope, scale and location of the Scott Field EA, it is expected that this action would result in similar issues and comments, so external scoping was not conducted. Internal scoping was performed with an interdisciplinary team of specialists within the BLM. Issues identified during the internal scoping process are discussed under the Affected Environment in Chapter 3. The EA was released to the public for a 30-day comment period. A press release announcing the availability of the EA for comments was published on July 22, 2013. The press release stated that the comment period for the EA would run for 30 days and end on August 20, 2013. For the specific comments and responses, see Appendix C, Public Comments and Responses.

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the components of the Proposed Action and the No Action Alternative, in compliance with NEPA guidance. The BLM considers alternatives to the Proposed Action based on issues, concerns, and opportunities raised during interdisciplinary interaction between resource professionals and collaboration with cooperating and other interested agencies. The only other alternative considered feasible or reasonable in this analysis is the No Action Alternative.

2.1 The Proposed Action

The proposed project would involve the construction of up to 40 additional well pads on lands with primarily private surface and federal minerals, with between two and six

wells drilled from each pad, to a maximum of 150 wells. Well spacing and downhole density would be in accordance with Chapter 3, Section 2 of the rules of WOGCC. Within the SFD project area the proposed project would add approximately one well pad per 1,100 acres and approximately one new well bore per 300 acres. Of the 40 additional well pads, up to 10 of those could hold six wells; these pads would be located in areas with the most favorable production potential. The entire well drilling process (up to 150 wells) and the construction of associated infrastructure would be completed over a period of 5 to 10 years. All of the proposed wells would be drilled utilizing horizontal drilling technology to maximize the potential of deep formations, including but not limited to the Sussex, Shannon, Frontier, Muddy, Mowry, Niobrara, and Dakota, for commercial oil and gas production at vertical depths between 9,500 and 13,000 feet. A small portion of the wells may be drilled for exploration purposes utilizing vertical drilling techniques but the location and number are not known at this time. As such, the evaluation of impacts will assume all wells will be drilled using horizontal drilling technology.

Drilling operations would be initiated as soon as all of the necessary permits have been obtained. These operations could last from 5 to 10 years, depending on the combination of drilling success, rig availability, permit approvals, and market conditions. Based on an average 40-year life of a productive well, the anticipated project life would be between 45 and 50 years.

Oil would be transported via trucks from storage facilities at each pad to bulk handling facilities in Casper or Douglas. Gas would be transported via subsurface pipelines to centralized compression and treatment facilities. Produced water would be transported by truck or piped to approved water-disposal wells or evaporation ponds, or would be used for potential beneficial use (e.g., drilling operations). Existing arterial roads would provide the main access to and within the SFD project area.

Operations would be conducted in full compliance with all applicable laws, regulations (43 CFR, Part 3100 et al.; 43 CFR, Part 2800 et al.), Onshore Oil and Gas Orders (43 CFR, Part 3160; March 7, 2007), the approved plan of operations, and any applicable Notices to Lessees.

Table 2-1 presents all proposed surface disturbance associated with the Proposed Action.

Table 2-1. Total Surface Disturbance Associated with the Proposed Action (Acres)

	Associated with Well Pads ¹	Roads	Pipelines	Total	Average Per Well Disturbance ²	Average Per Pad Disturbance ¹
Initial	237	96	353	686	4.6	17.2
Long-Term	175	67	0	242	1.6	6.05

¹ 40 pads. Includes pad construction, topsoil and spoil storage areas, and any required berms

² Assuming all 150 wells are drilled

2.1.1 Construction Activities

General construction activities for each proposed well pad, access road, and ancillary facilities would follow practices and procedures outlined in the Scott Field Master Surface Use Plan (MSUP) and in each individual APD, including COAs appended to the APD by the BLM, or any accompanying mitigation measures included in the DR. Access road and well pad construction activities would follow guidelines and standards set forth in the BLM/U.S. Forest Service (USFS) publication, *The Gold Book: Surface Operating Standards for Oil and Gas Exploration and Development* (Fourth Edition) (BLM 2007a) and/or the contractual requirements of the state and any affected private (fee) surface owner(s).

2.1.1.1 Access Roads

Access to the SFD project area would generally be from Wyoming Highway 59 and the Highland Loop Road (Converse County Road #32) and then, to the extent possible, via existing, upgraded oilfield roads (crowned and ditched with gravel running surfaces). Since the project would be an infill development in the existing Scott Field, existing roads would be utilized wherever possible and new road construction would not be extensive. Currently there are approximately 147 miles of roads of varying types within the SFD project area, not including 2-track roads. New road construction would primarily be short sections of road from the existing road network to individual new well pads. Some existing access roads may need to be improved (crowned and ditched with gravel running surfaces) to accommodate increased traffic. The actual locations of pads have not been determined at this time, but based on existing SRC development in the neighboring Hornbuckle Field, the average amount of per pad short-term road construction is estimated at approximately 2,600 feet, which would result in about 2.4 acres of disturbance (assuming a 40 foot wide disturbance footprint). The estimated total initial (short-term) surface disturbance associated with road construction for the 40 pads is 96 acres. The total long-term disturbance (following interim reclamation) associated with access roads is estimated at 67 acres. The actual placement of pads would utilize existing roads to the extent possible so the disturbance acreages associated with access roads would be less than the estimates.

2.1.1.2 Well Pads

Major components of the proposed well pads would include:

- A leveled area suitable for placement/support of the drilling rig and related equipment including the space required for the permanent burial of the drill cuttings generated during the drilling of the wells;
- One earthen reserve pit, or the appropriate number of above ground tanks, designed to contain fresh water fluids to be used during the completion operation; and
- Storage tanks for produced water and oil.

Average disturbance per pad would be 5.93 acres (not including the access road). Construction of all 40 well pads would result in approximately 237 acres of additional initial surface disturbance within the SFD project area. Long-term disturbance associated with the pads (following 1.55 acres of interim reclamation at each pad) is estimated to be approximately 175 acres.

2.1.2 Drilling Operations

Well-drilling and completion activities will be in compliance with BLM Onshore Oil and Gas Order No. 2. These guidelines specify the following:

...proposed casing and cementing programs shall be conducted as approved to protect or isolate all usable water zones, potentially productive zones, lost-circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. Any isolating medium other than cement shall receive approval prior to use (BLM 1988).

SRC would drill each well with a rotary drilling rig. Drilling operations, including mobilization, demobilization, and drilling to the target depth, would require approximately 30 days per well. SRC would drill year-round, subject to environmental considerations. Based on SRC's experience with the neighboring Hornbuckle Field, two to three rigs would typically be running continuously, within between 12 and 24 wells completed and put into production each year.

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, which takes approximately 7 days. Technicians and service personnel would commute to the project site daily.

On average, SRC would utilize approximately 2,500 barrels (bbls) of water to drill the initial 2,000 feet. Following installation of surface casing, a water based mud would be used to drill to the intermediate casing point, which would be through the Parkman Formation at approximately 8,500 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 milligrams per liter [mg/L]). Water use for the drilling and installation of the intermediate casing would be approximately 2,500 bbls. Drilling water would be obtained from an approved source in the immediate SFD project area. The specific source of this fresh water used in drilling operations for each well would be identified at the time of APD submittal. If conditions allow, SRC may recycle any water remaining in the freshwater mud system for use during drilling of additional wells on a pad. Upon completion of surface drilling operations on a pad, any water remaining in the mud tanks would be available for re-use on additional wells, transferred to a reserve pit for evaporation or trucked to an approved disposal facility, as appropriate. Cementing operations would be

conducted in compliance with Onshore Oil and Gas Order Number 2. Upon installation of the intermediate casing, SRC would switch to an oil-based mud (OBM) system to complete the drilling process. Approximately 400 bbls of water would be used per well in the OBM system. Following the completion of drilling operations, any remaining oil-based fluids would be removed from the well location and either recycled into the OBM system for subsequent wells or disposed of in accordance with appropriate BLM and WOGCC rules and regulations. The average amount of water required for drilling each well would be approximately 5, 400 bbls (0.7 ac-ft).

Reserve pits would be used to contain water-based drilling fluids, cuttings, and wastewater produced from the well-drilling operations. The reserve pits would be constructed with an impermeable liner to prevent seepage and possible contamination of surface and groundwater. Fresh water may be stored in lined pits or tanks in accordance with WOGCC regulations. Leakage of pit fluids would only occur if the liners were installed incorrectly or the liners were damaged during drilling operations. The reserve pits would be appropriately fenced to prevent access by persons, wildlife, or livestock and in some situations and locations, precautions, such as netting, may be required to prevent access and mortality of birds and other animals (BLM 2007a).

As indicated above, surface casing would be set to an approximate depth of 2,000 feet and cemented back to the surface during the drilling operations. This would serve to isolate all near-surface fresh water zones or aquifers in the SFD project area.

Intermediate casing would be set to a measured depth between 7,000 and 12,000 feet and would also be cemented in place, with the top of cement designed to be above the top of the Fox Hills Formation. This procedure would isolate potential hydrocarbon bearing zones below the Fox Hills Formation from near-surface freshwater aquifers.

Well completion operations would follow installation of production casing. In general, completion consists of perforating the production casing, pressure testing (hydrostatic testing), stimulation of the formation utilizing hydraulic fracturing (HF) technology, flow-back of HF fluids into tanks, flow testing to determine post-fracture productivity, and installation of production equipment to facilitate hydrocarbon recovery.

Discussions regarding possible impacts from completion operations are included in Chapter 4.

These completion operations would generally require an average of 30 days per well. Following completion, the well would be allowed to flow under natural pressure for one to four months, after which a pumping system would be installed. A freshwater pit may be constructed at each well pad to hold the estimated 50,000 bbls (6.4 ac-ft) of water required for the HF operation on each horizontal well. Water would be acquired from an already appropriated source or from a new water well permit (issued by WSEO to appropriate groundwater).

Approximately 55,400 bbls (7.1 ac-ft) of water would be required for drilling and completion of each well. A total of approximately 8.3 million bbls (1,071 ac-ft) of water would be required for all 150 wells. According to the most recent information available

from the USGS, in 2005 the total fresh water use in Converse County was approximately 936 ac-ft per day (USGS 2013). The total projected water use for the SFD project is comparable to 1.14 days of groundwater use at the current rate and will be distributed over the estimated 5 to 10 years of project life. The projected water use for the development of the SFD project (1,071 ac-ft) when averaged over the 5- to 10-year development period equates to an average of 0.29 to 0.59 ac-ft per day or an increase of only about 0.03 to 0.06 percent over current use.

Use or discharge of hydrostatic test water would be accomplished in a manner that would not affect soils, stream channels, surface water, and groundwater quality. After testing operations are completed, the water would be pumped into water-hauling trucks and transported to drilling locations within the project area to be used in conjunction with drilling operations or reused for other aspects of the construction and/or production process. If such water is not reused it will be disposed of in such a manner that soil-scouring and water-quality impairment would not result.

Hydrostatic test water would be evaluated for compliance with state water-quality standards and no test water would be discharged unless such water meets these standards. Test water not utilized for drilling operations that meets water-quality standards would be disposed of onto undisturbed land having vegetative cover or into an established drainage channel in a manner that would not cause accelerated erosion. Further, use and disposal of hydrostatic test water would comply with the mandatory right-of-way stipulation for hydrostatic testing as well as the plans of development (POD), the CWA, and the WYPDES permit that would be required for the proposed project.

2.1.3 Production Operations

2.1.3.1 Oil Production

Oil production facilities for multiple wells per pad are essentially a small central facility capable of processing the oil, gas, and water produced from each well. Typical oil production equipment required at the individual well locations would include the following:

- 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 for situations where commercial quantities of natural gas are not encountered and the product must be flared;
- A connection point for loading tanker trucks used in hauling oil and water produced by each well;
- A portable lease automatic custody transfer (LACT) unit may be used if an electrical supply is available and other measuring options are not feasible; and
- Up to six metering houses for measuring the natural gas from each well.

Oil would be trucked to the purchaser's designation or to a pre-existing oil terminal for sales. The frequency of trucking activity would depend upon the amount of oil being produced from each individual well. Water would also be required for dust suppression on access and county roads. These needs would increase as a result of the additional traffic generated as a consequence of well service activities for the 150 new wells. Annual fresh water use for dust suppression is estimated at 15,000 bbls. Based on an estimated 50 year project life, the total requirement for dust suppression would be 750,000 bbls (96.7 ac-ft).

There is potential for a future interstate oil pipeline to be constructed in the vicinity of the Scott Field. If that occurs, oil gathering lines may be installed in new or existing gas pipeline and road ROWs, if feasible. Approximately 83.2 miles (353 acres) of new gas and water pipelines ROW and 19.8 miles (96 acres) of 40-foot wide road ROW would be required for the new wells/pads associated with the Scott Field development. SRC anticipates that any oil gathering lines would be installed in existing ROW, where available, or in new ROW obtained for that purpose.

SRC is proposing to utilize a tiered approach for supplying power to well pad facilities. Until commercial electrical power is available, SRC would utilize temporary generators on well pads to power electric pumping units and portable LACT units (when used) and safety equipment for the production vessels. In instances where electrical power is not available and portable LACT units are not used, oil would be measured manually by measuring tank volumes and gas would be measured using meters not requiring electric power.

Once commercial electrical power becomes available, power lines would be installed to replace the temporary generators. Power lines would be installed either above ground or underground, depending on landowner preference. To minimize disturbance, power lines would be installed along road ROW to the extent possible. For the purposes of safety, power lines installed using road ROW would be placed on the opposite side of gas/oil/water corridors, if present.

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 horsepower (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 WDEQ/AQD under standard air permitting practices.

2.1.3.2 Natural Gas Production

Commercial quantities of natural gas may be expected from the target formations. Meter houses to facilitate gas sales from each individual well bore would be installed at a centralized pad location (see Appendix A). To the extent possible SRC would use the existing third-party operated natural gas gathering infrastructure that serves the current Scott Field area. SRC anticipates that the existing Scott Field gas gathering infrastructure would be expanded to accommodate production from the new SRC wells. Under the Proposed Action, new gas gathering pipelines would be installed to take custody of the metered natural gas at the well pad. It is estimated that approximately 49.9 miles of new 25 foot-wide gathering pipeline ROW and 33.3 miles of new 50 foot-wide pipeline ROW would be required, resulting in approximately 353 acres of initial disturbance (see Table 2-1). No long-term disturbance associated with pipeline installation is anticipated assuming all pipelines would be installed within road ROWs or assuming all of the out-of-ROW pipeline corridors would be successfully reclaimed.

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 USDI Notice to Lessees 4A (USDI 1980).

2.1.3.3 Produced Water Disposal

For the purposes of this discussion, produced water refers to water produced during oil/natural gas recovery and does not include water recovered during well development. Produced water would be separated from product at the pad and temporarily stored in tanks at the well site prior to being transported by trucks or by pipeline to a permitted collection/disposal facility. Under the Proposed Action, water pipeline would be installed in the same ROW as natural gas pipeline and as close to the existing road as possible. Anticipated average water production is estimated to be 30 bbls per day per well (annual production of 10,950 bbls per well). Produced water would be disposed of via subsurface injection, surface evaporative pits, or used for 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. WDEQ records indicate that there were four permitted underground injection control (UIC) facilities and 11 permitted evaporation facilities in Converse County as of April 10, 2013 (WDEQ 2013).

2.1.3.4 Projected Water Use

Water would be utilized for the various phases of the proposed project. Table 2-2 indicates the projected water use by phase and for the anticipated project life.

Table 2-2. Projected Water Use by Phase

	Phase Amount¹ (bbls)	Total² (bbls)	Total³ (Ac-ft)
Drilling Operation			
Drilling	5,400	810,000	104.4
Well Completion ⁴	50,000	7,500,000	966.8
Maintenance			
Dust Suppression	15,000	750,000	96.7
Total	--	9,060,000	1,167.9

¹ Per well for drilling operations and per year for maintenance

² 150 wells total for drilling operations and a maximum 50-year project life for maintenance

³ Based on 42 gallons per bbl

⁴ Includes hydrostatic testing and hydraulic fracturing

2.1.4 Interim Reclamation During Production

Interim reclamation of each well location would be conducted in accordance with Onshore Order #1, IM WY-2012-007, Management of Oil and Gas Exploration and Production Pits and IM WY-2012-032, Wyoming BLM Reclamation Policy, and The Gold Book (BLM 2007a).

Solidification, back filling, and capping of the cuttings pits would be accomplished within 6 months following the completion of each individual well. The proposed co-location of multiple wells on each well pad has the potential to conduct drilling and production activities simultaneously. When more than one well for the same location are approved at the same time, interim reclamation would be performed following completion of the last well on the pad or the expiration of the APD, whichever occurs first. Erosion control would be maintained through prompt revegetation and by constructing surface water drainage control structures such as berms, diversion ditches and waterbars as necessary on the proposed well location(s). Topsoil stored for a period greater than 90 days will not exceed piles of 3 feet in depth and will be seeded with a BLM approved seed mix to prevent wind and water erosion and to reduce the loss of microbial activity within the soil. Approximately 26 percent (62 acres) of the well pad disturbance, approximately 30 percent (29 acres) of the new road disturbance, and 100 percent (353 acres) of the new pipeline disturbance would be reclaimed in the manner indicated above, which equals a total of 444 acres of interim reclamation.

2.1.5 Abandonment and Final Reclamation

Final reclamation would be performed in accordance with Instructional Memorandum No. WY-2012-032, BLM Reclamation Policy, within 6 months of completion of plugging each well. Upon final abandonment of each well, all existing surface facilities

specific to the well would be removed from the well location, the well bore would be physically plugged with cement as directed by the BLM, and a dry hole marker would be set in accordance with existing regulations and directions contained in the approved APD. Upon completion of all plugging operations at a well pad location, any remaining surface facilities would be removed and both the access road and remaining work areas would be scarified and recontoured, erosion control measures would be installed as necessary, and all disturbed areas would be reseeded as recommended by the BLM or private surface owner. There may be circumstances where the private surface owner may wish to retain specific access roads for future use at the time of final abandonment.

2.1.6 Ancillary Facilities

A central processing facility and a central power generating facility may be constructed at a later date. Neither of these facilities is planned at this time and neither is included in this EA so additional environmental analyses would be required prior to permitting and construction of those facilities. No man camps are planned within the SFD project area. SRC does not anticipate the need for any new gas compression facilities to facilitate handling of natural gas at this time.

2.2 Alternative I - The No Action Alternative

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. Additional NEPA analysis on a case-by-case basis, where valid and existing lease rights occur, would be required.

In accordance with the NEPA Handbook (H-1790-1 2008a) in Section 8.3.4.2, “Although the regulation at 40 CFR 1508.9(b) makes no specific mention of the No Action Alternative with respect to EAs, the [Council on Environmental Quality] CEQ has interpreted the regulations generally to require some consideration of the No Action Alternative in an EA. The CEQ has issued guidance stating: “you may contrast the impacts of the proposed action and alternatives with the current condition and expected future condition in the absence of the project. This constitutes consideration of a no-action alternative as well as demonstrating the need for the project.”

In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development. Notices of staking (NOSs), APDs, and PODs would require individual NEPA analyses on a case-by-case basis, where valid and existing lease rights occur.

The BLM cannot determine whether a lease will be drilled, explored, or developed. In addition, the BLM cannot reasonably determine where companies will propose to develop wells on a given lease before the lessee files a NOS, APD, or a POD. In an effort to quantify what the current and expected future condition in the absence of the

project would resemble, the BLM looked at the project area, current leases and the status of those leases.

Production in sufficient quantities of some type of oil or gas is required, prior to expiration, for a lease to attain “held by production” status. Some leases may never be drilled and expire, some may be drilled but never reach commercial production quantities and expire, while others will produce commercial quantities and achieve held by production status. With unknown drilling success and changing economic conditions, it would be speculative for the BLM to determine an accurate drilling ratio.

For the purpose of this analysis, the BLM has identified that the current condition and expected future condition, in the absence of the Proposed Action, would be at least the minimum amount of drilling consistent with valid and existing rights. Within the project area, there are 47 federal oil and gas leases. BLM LR2000 records indicate that 15 have not achieved held by production status (BLM 2013). At a minimum, these 15 leases would need approvals for one well per lease to retain their valid, existing lease rights.

It is possible that more than 15 wells will be drilled within the project area on a combination of leases not held by production and leases that are already held by production. However it is dependent on too many external factors to determine what that amount will be.

Federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development. If the No Action Alternative is chosen, NOSs, APDs, and PODs would require individual NEPA analyses on a case-by-case basis.

2.3 Other Action Alternatives

No other action alternatives were recommended during the internal scoping.

2.4 Alternatives Considered but Not Analyzed in Detail

An alternative was considered that included the assessment of the 150 wells on 40 pads with inclusion of a large central facility, including tank batteries for the storage of produced water and oil and natural gas metering facilities. Oil and natural gas pipelines would connect outlying wells to the large central facility. These new pipelines would decrease traffic impacts related to hauling of oil and produced water but would increase to the overall project disturbance. In addition, (under the Proposed Action), the well pads with up to six wells each already minimize surface disturbance relative to single-well pads, achieving some of the benefits of a central facility. This potential alternative would result in a slight increase in disturbance relative to the Proposed Action without an increase in the potential to recover oil or natural gas. This potential alternative would not be beneficial to SRC and would not reduce the overall project related impacts since much of the benefit is already achieved

with the multiple wells per pad configuration included in the Proposed Action. As such, the alternative was removed from further consideration.

3.0 AFFECTED ENVIRONMENT

This chapter describes the affected environment in the SFD project area, and pertinent existing development, impacts, and disturbances are described. This description is organized by resource with descriptive information obtained from a wide range of sources, including the BLM and various other federal and state agencies as appropriate. Only those resources that would potentially be impacted by the Proposed Action are discussed in detail.

3.1 General Setting of the SFD Project Area

The SFD project area is in Converse County, Wyoming, approximately 20 miles north of the town of Douglas at elevations ranging from a low of 4,805 feet where Box Creek leaves the project area in the SE $\frac{1}{4}$ of Section 14, T36N, R71W to a high of 5,590 feet at the southwest corner of the project area in the SW $\frac{1}{4}$ of Section 31, T35N, R72W.

The SFD project area is primarily an area of rolling plains (short-grass prairie) that is predominantly used for livestock grazing. Man-made intrusions on the natural landscape in the area include oil and gas development (oil well pad facilities, pipeline and utility ROWs, and access roads), transportation facilities (public and private roads, road signage, power and utility transmission lines), ranching activities (fences, ranch buildings, and livestock), and environmental monitoring installations.

3.2 Existing Oil and Gas Development in the SFD Project Area

According to August 2012 electronic records of the WOGCC, 267 oil or gas wells had been approved in the SFD project area (WOGCC 2012). The records indicate that 252 wells were actually drilled. One other well was permitted but not yet drilled. Of 253 wells, 203 permits are still valid (not permanently abandoned). A breakdown of these valid well permits is as follows:

- 163 producing wells;
- 20 inactive wells (shut-in, dormant, suspended operations, or temporarily abandoned);
- 18 confidential or unknown status wells;
- 1 well permitted but not drilled; and
- 1 active injector well.

Past conventional oil and gas drilling activity in the SFD project area has tested various geological horizons for hydrocarbon production at depths ranging between 8,324 and 13,058 feet. The WOGCC records indicate completions in the Sussex, Parkman, Lakota, Dakota, and Cody formations, with the Parkman Formation being

the most prolific oil producing formation in the SFD project area (WOGCC 2012). A breakdown of the 163 wells still producing by formation is as follows:

- 142 - Parkman Formation;
- 18 - Sussex Formation;
- 1 - Cody;
- 1 - Lakota Formation; and
- 1 - Dakota Formation.

According to WOGCC records, as of August 2012, there are no coal bed natural gas (CBNG) wells in the SFD project area.

A list of current federal oil and gas leases within the SFD project area is provided in Appendix B.

3.3 Air Resources

This EA incorporates an analysis of the contributions of the proposed activities to greenhouse gas (GHG) emissions and a general discussion of potential impacts to climate. Air resources include climate, climate change, air quality, air quality-related values (AQRV) (including visibility and atmospheric deposition), noise, and smoke management. Therefore, NEPA requires the BLM to consider and analyze the potential effects of BLM and BLM-authorized activities on air resources as part of the planning and decision-making process.

The air quality of any region is controlled primarily by the magnitude and distribution of pollutant emissions and the regional climate. The transport of pollutants from specific source areas is affected by local topography. In the mountainous western United States, topography is particularly important in channeling pollutants along valleys, creating upslope and downslope circulations that may entrain airborne pollutants and block the flow of pollutants toward certain areas. In general, local effects are superimposed on the general weather regime and are most important when the regional wind flow is weak.

New information about GHGs and their effects on national and global climate conditions has emerged. On-going scientific research has identified the potential impacts of GHG emissions such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), water vapor; and several trace gases on global climate. Through complex interactions on a global scale, GHG emissions cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and burning fossil carbon sources have caused GHG concentrations to increase measurably and may contribute to overall climatic changes.

3.3.1 Air Quality

The Clean Air Act requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants (criteria pollutants). The NAAQS prescribe limits on pollutants considered to endanger public health and the environment. The six criteria pollutants include nitrogen dioxide (NO₂), carbon monoxide (CO), sulfur dioxide (SO₂), particulate matter [less than 10 microns in size (PM₁₀) and particulate matter less than 2.5 microns in size (PM_{2.5})], lead, and ozone (O₃). Ozone is created by chemical reactions between oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight. Current national and Wyoming Ambient Air Quality Standards (WAAQS) for these criteria pollutants are presented in Table 3-1.

Table 3-1. Selected National and Wyoming Ambient Air Quality Standards

Criteria Air Pollutant		Averaging Time Period	NAAQS ¹	WAAQS ²
Particulate Matter	PM ₁₀ (microgram per cubic meter [µg/m ³])	24-hour	150	150
		AAM ³	ns ⁴	50
	PM _{2.5} (µg/m ³)	24-hour	35	35
		AAM	15	15
Lead (µg/m ³)		Rolling 3-month	0.15	ns
		Quarterly	1.5	1.5
Ozone (O ₃) (Parts per Million [ppm])		1-hour	0.12	ns
		8-hour	0.075	0.08
Nitrogen dioxide (NO ₂) (ppm)		1-hour	0.10	ns
		AAM	0.053	0.05
Sulfur dioxide (SO ₂) (ppm)		1-hour	0.075	ns
		3-hour	0.50	0.50
		24-hour	0.14	0.10
		AAM	0.03	0.02
Carbon monoxide (CO) (ppm)		1-hour	35	35
		8-hour	9	9

¹ NAAQS = National Ambient Air Quality Standards (adapted from 40 CFR §50.5-50.12). Primary standard unless otherwise noted. National Primary Standards establish the level of air quality necessary to protect public health from any known or anticipated effects of a pollutant, allowing a margin of safety to protect sensitive members of the population.

² WAAQS = Wyoming Ambient Air Quality Standard (adapted from WDEQ/AQD 2010).

³ AAM = annual arithmetic mean.

⁴ ns = no standard.

No site-specific air quality data are available from the proposed SFD project area; however, applicable air quality data are available from EPA's Air Quality System (AQS) and the WDEQ utilizing WDEQ state and local air monitoring sites (SLAMS) and

WDEQ special purpose monitor (SPM) sites. Not all six criteria pollutants are monitored at the SLAMS and SPM sites. The nearest SLAMS site is located in the city of Casper (approximately 45 miles southwest of the SFD project area). The Casper SLAMS site measures PM₁₀ and PM_{2.5}. The SPM sites include the Antelope Coal Mine in Converse County (approximately 21 miles north of the SFD project area), the Thunder Basin Grassland site (approximately 106 miles north of the SFD project area), and the south Campbell County site (approximately 70 miles north of the SFD project area). The Antelope Coal Mine SPM site monitors PM_{2.5} and NO_x, the Thunder Basin Grassland SPM site monitors O₃ levels and NO_x, and the south Campbell County SPM site measures O₃ levels, in addition to PM₁₀ and NO_x. Additional air quality data (NO₂, O₃, and SO₂) were obtained from the Sinclair Refinery, approximately 41 miles southwest of the SFD project area.

The principal air-borne pollutant within the proposed SFD project area is particulate matter in the form of fugitive dust (uncontrolled wind-carried particulates) generated from natural and human sources. Visibility data collected in 2010 within the High Plains District, which includes the project area, shows very good to excellent visibility ranges (BLM 2012b).

As of July 2012, both Converse County and the SFD project area are considered to be in attainment for the NAAQS and the WAAQS (EPA 2012 and WDEQ/AQD 2010).

Visibility is also expressed in terms of deciview (dv). The dv index was developed as a linear perceived visual change (Pitchford and Malm 1994), and is the unit of measure used in the EPA's Regional Haze Rule to achieve the National Visibility Goal. The National Visibility Goal was established as part of the CAA in order to prevent any future, and remedy any existing, impairment of visibility in mandatory Federal Class I areas that result from manmade air pollution. The deciview index is a scale related to visual perception that has a value near zero for a pristine atmosphere. A change in visibility of 1.0 dv represents a "just noticeable change" by an average person under most circumstances. Increasing dv values represent proportionately larger perceived visibility impairment. The BLM works cooperatively with several other federal agencies to measure visibility with the IMPROVE network. Data collected at the Badlands National Park and Cloud Peak Wilderness IMPROVE monitoring sites have been used indirectly to assess the visibility in the High Plains DO. Figure 3-1 presents visibility data for the Badlands IMPROVE site and the Cloud Peak IMPROVE site for the period preceding 2010. The data for the two sites are consistent and show very good to excellent visibility ranges (0 to 20 dv equals a visual range of 125 to 250 miles) within the High Plains DO, even for the 20 percent haziest days.

3.3.2 Greenhouse Gases

Greenhouse gases in the US Greenhouse Gas Inventory include: CO₂, CH₄, N₂O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). CO₂ and CH₄ are typically emitted from combustion activities or directly emitted into the atmosphere through natural processes. Emissions of greenhouse gases are

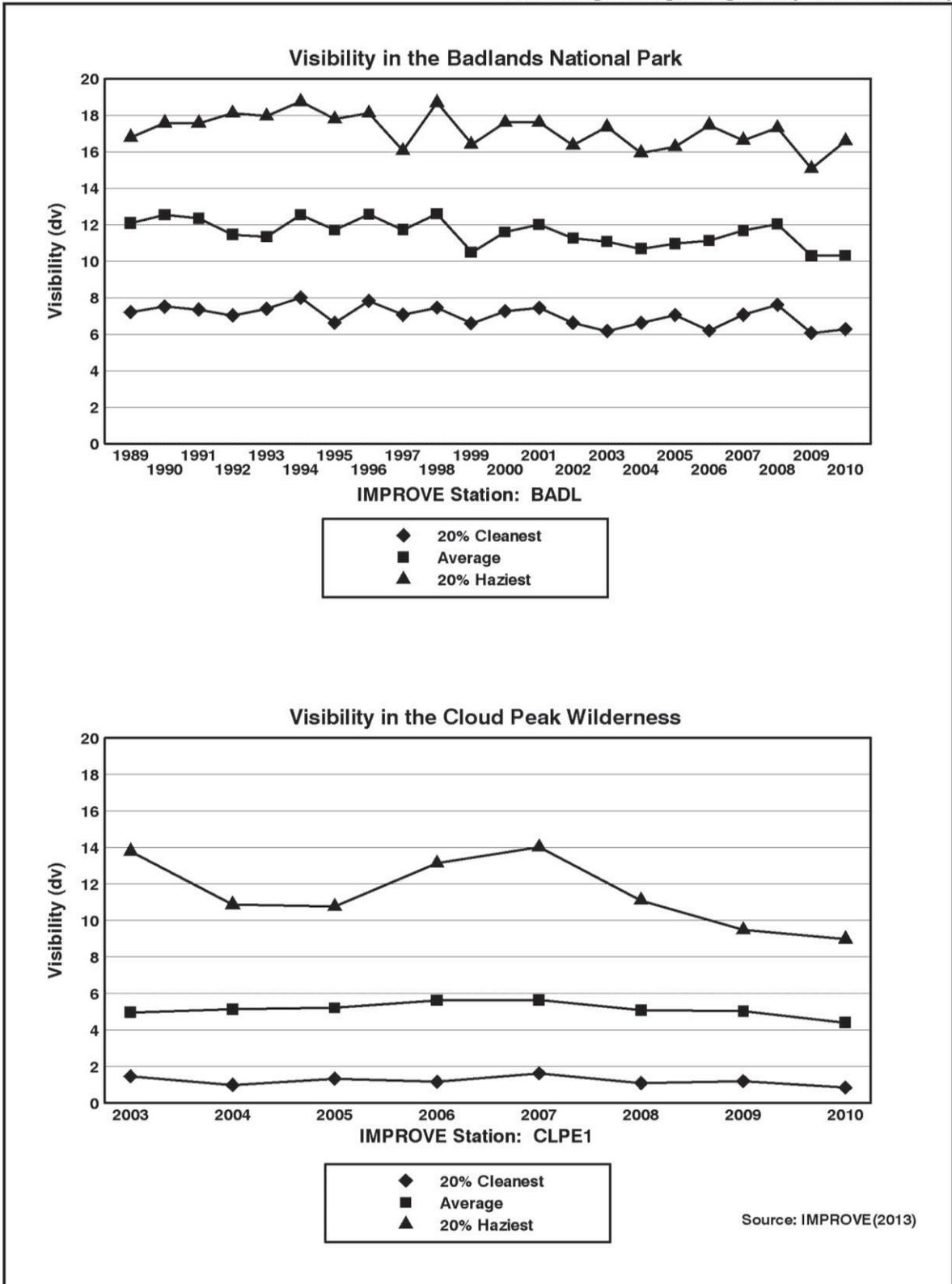


Figure 3-1. Visibility in the Badlands National Park and Cloud Peak Wilderness Area

usually reported as equivalent CO₂ (CO₂e), which is the amount of the gas emitted multiplied by its warming potential relative to CO₂.

Currently, the WDEQ/AQD does not regulate greenhouse gas emissions, although these emissions are regulated indirectly by various other regulations. Some greenhouse gases such as CO₂ occur naturally and are emitted to the atmosphere through both natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities.

Several activities occur within the region that may generate greenhouse gas emissions, including oil, gas, and coal development; large fires; livestock grazing; and recreation using combustion engines, which can potentially generate CO₂ and/or CH₄. Oil and gas development activities can generate CO₂ and CH₄. CO₂ emissions result from the use of combustion engines, while methane can be released during processing. Wildland fires also are a source of other GHG emissions, while livestock grazing is a source of CH₄.

3.4 Heritage Resources

3.4.1 Cultural Resources

All lands addressed in this environmental analysis have the potential to contain cultural resource materials. The Wyoming State Historic Preservation Office (SHPO) Records Division database was checked for information on previous Class III cultural resource surveys and sites within the SFD project area. Those database records indicate that of the 44,619 acres encompassing the project area approximately 3,210 acres of the total surface estate have been previously surveyed to present-day Class III cultural resource inventory standards since 1980. These block surveys of 10 acres or more, all for well pads, represent approximately 7 percent of the surface estate. In addition, thirty-two Class III cultural resource inventories have been conducted since 1980 for linear projects including access roads, pipelines, a power line, and seismic lines. All previous inventories were conducted in compliance with the NHPA. Copies of cultural resource inventory reports are currently on file with both the BLM CFO in Casper, Wyoming and the SHPO Records Office in Laramie, Wyoming.

The Class III cultural resource inventories described above have identified 62 sites and several isolated artifacts. These 62 sites represent most of the known prehistoric and historic time periods of human use and occupation within the study area. The site types include: lithic scatters (27), habitation sites (usually identified as those with lithic artifacts, burned rocks and hearths) (19), stone circles (4), rock cairns (2), and a U-shaped rock structure (1). Historic sites include a herder camp (1), homesteads (7), and a historic road (1).

Previously recorded diagnostic artifacts do not include any from the Paleoindian Period (11,000 - 6,000 B.C.), although points that date to this time period have been found in surrounding areas and would be expected here also. The Archaic Period (6,000 B.C. - A.D. 500) is represented in the records for the SFD project area by a Middle Archaic

McKean point and a Duncan-Hanna point, although earlier Archaic occupations undoubtedly occur here, and the Middle Archaic is probably much better represented than indicated by these two points. The Late Archaic is represented by two generic dart points, although the period is obviously underrepresented. Several Late Prehistoric Period (A.D. 500 -1700) points have been recorded and include a Besant point and ten corner- and side-notched arrow point forms. Protohistoric Period (A.D. 1700 - 1806) Native American sites may include some of the lithic scatters and cairns because those sites have not been firmly dated and metal points occur only in private collections. The Historic Period (A.D. 1806–1900) is represented mainly by Euroamerican homestead remains, but there is also a potential for Native American and Army sites from this period as well. Several sites within the study area exhibit buried cultural deposits up to a meter in depth.

3.4.2 *Native American Religious Concerns*

Native American groups historically associated with this area consider prehistoric rock alignments, rock cairns, rock piles (of various possible ages and functions), stone circles, rock art, and potential funerary sites as culturally sensitive, even though the ages and cultural affiliations of the sites are unknown. All sites of these types have been recorded within surrounding areas of the Powder River Basin and are likely to exist within the SFD project area.

Tribal consultation on sites of these types would be required for evaluation, provisional identification, and possible subsequent protection of sensitive cultural sites. Cairns and stone circles have been previously recorded within the SFD project area, and others are likely to be encountered during future inventories.

3.4.3 *Paleontology*

The surface geology of the study area has been classified and scored by the Potential Fossil Yield Classification (PFYC) system which indicates the relative potential for fossil materials to be present in given locations. The PFYC is a relative value that rates the potential for an entire formation and is not a true indicator of the presence or absence of fossils in any given location. For example, Morrison Shale has high concentrations of paleontological materials in some areas and is devoid of them elsewhere. The numeric score is between one and five, with five being the most sensitive. Paleontology localities are common in formations with a PFYC rating of five. The bedrock formation in the study area has a PFYC rating of 3/3a or a moderate potential for the presence of fossil materials.

3.5 *Vegetation*

3.5.1 *Primary Cover Types*

The area is within the Powder River Basin Ecoregion of Wyoming. This Level IV ecoregion is characterized by a mixed-grass prairie dominated by blue grama

(*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), prairie junegrass (*Koeleria macrantha*), Sandberg bluegrass (*Poa secunda*), needle-and-thread grass (*Hesperostipa comata*), rabbitbrush (*Chrysothamnus* spp.), fringed sage (*Artemisia frigida*), and other forbs, shrubs and grasses (Chapman et al. 2004). Native plants in the SFD project area are predominantly drought-tolerant low shrub, grass, and flowering forb species that are generally distributed according to the biological, chemical, and physical properties of the parent soils of the area, as well as elevation, slope, aspect, and water availability.

The vegetation/land cover types within the SFD project area were determined using geographical information system (GIS) mapping obtained from the Wyoming Gap Analysis project (WY-GAP) (Reiners et al. 2000). The primary cover types are included in Table 3-2.

Table 3-2. Primary Vegetation/Land Cover Type within the SFD Project Area

Vegetation/Land Cover	Acres	Percent of SFD Project Area
Mixed-grass prairie	19,721	44.2
Wyoming big sagebrush	19,103	42.8
Greasewood fans and flats	3,360	7.5
Desert shrub	1,885	4.2
Basin exposed rock/soil	550	1.2
Total	44,619	100.0

3.5.2 Threatened and Endangered Plant Species

There are four threatened or endangered plant species listed by the USFWS with the potential to occur within the area under the jurisdiction of the CFO: the Ute ladies-tresses orchid (*Spiranthes dilvialis*), the blowout Penstemon (*Penstemon haydenii*), the Colorado butterfly plant (*Gaura neomexicana coloradensis*), and the western prairie fringed orchid (*Platanthera praeclara*).

Ute ladies'-tresses orchid, listed as threatened, occurs in moist riparian and wetland habitats (Heidel 2007). No populations have been documented within the SFD project area (WYNDD 2012); however, potential habitat has been identified by Wyoming Natural Diversity Database (WYNDD) (Fertig and Thurston 2003), primarily along Lightning Creek. Potential habitats were ground-truthed, and some marginally suitable habitat was found to be concentrated along the North Fork of Box Creek and Box Creek, outside of the WYNDD-modeled potential habitat. Some small patches of suitable habitat were also present along Lightning Creek near the WYNDD-modeled habitat. None of the creeks in the area contained flowing water at the time of the survey. The riparian habitats observed were composed of intermittent pools of standing water, which is considered only marginally suitable habitat for Ute ladies'-tresses. Surveys conducted during the mid-August to early September bloom period of

2012 by Hayden-Wing Associates, LLC (HWA) found no plants in the area (HWA 2012). Drought conditions could have made Ute ladies'-tresses orchid flowers less visible during the survey period but the lack of documentation of the plant in the area makes it unlikely it occurs in the area.

Blowout penstemon, listed as endangered, occurs on early successional, steep active sand dunes (Fertig 2000a). This habitat type is not present within the SFD project area, making it very unlikely that this species would be present. Further, the USFWS indicates no occurrences of this species in Converse County.

The western prairie fringed orchid occurs along the Platte River and would only be affected if water were being removed or altered from the Platte River or its tributaries for the proposed project. The SFD project area is not within the Platte River watershed and therefore the western fringed orchid is not addressed in this document.

The Colorado butterfly plant grows in sub-irrigated, alluvial soils of drainage bottoms surrounded by mixed grass prairie (Spackman et al. 1997). The Colorado butterfly plant is a member of the Evening Primrose Family (*Onagraceae*) and typically blooms from June to September. This species has not been found in SFD Project area, and the closest known population is on Teepee Ring Creek in Platte County on private land.

3.5.3 BLM Sensitive Plant Species

There are six BLM sensitive plant species that may occur on lands managed by the Casper Field Office, summarized in Table 3-3. Each species has a very specific set of habitat requirements. Suitable habitat is absent within the SFD project area for all species except the many-stemmed spider-flower, which occurs near alkaline playas and streams. Alkaline habitat is possible in portions of the project area with greasewood habitat (approximately 7.5 percent of the project area) or playas with exposed soil (approximately 1.2 percent of the project area). However, there are no perennial streams in the project area. The many-stemmed spider-flower has not been previously documented in Converse County and is therefore not likely to occur in the SFD project area.

3.5.4 Invasive, Non-Native Plant Species

Many invasive, 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 Wyoming Statute (W.S.) 11-12-104 are identified in Table 3-4. Surveys for noxious weeds within the SFD project area were not conducted as part of the environmental assessment.

A complete noxious weed inventory has not been completed for the SFD project area; however, a list was completed during 2012 surveys utilizing opportunistic observations and included the following noxious species: Russian olive (*Elaeagnus*

Table 3-3. BLM Sensitive Plant Species that May Occur within Lands of the Casper Field Office

Species	Scientific name	Description ¹	Likely to occur
Laramie Columbine	<i>Aquilegia laramiensis</i>	Habitat: Barren outcrops in forested areas, concentrated near Laramie Peak. Distribution: This species occurs in Converse and Albany counties. Substrate: Limited to granite outcrops. Elevation: 5,500-10,000'. Flowers: June-July	NO
Laramie False Sagebrush	<i>Sphaeromeria simplex</i>	Habitat: Dry, pebbly windswept plains, in cushion plant communities. Distribution: Occurs in Albany, Carbon, Converse and Natrona counties. Substrate: Limestone. Elevation: 7,200-8,700'.	NO
Many-stemmed Spider-Flower	<i>Cleome multicaulis</i>	Habitat: Moist, whitish alkaline soils, often with <i>Distichlis stricta</i> , <i>Spartina gracilis</i> , <i>Juncus balticus</i> , and <i>Scirpus nevadensis</i> . Generally near playas. Distribution: Patchy, throughout west-central and southern USA. Currently known in Natrona County. Elevation: ~5,900', variable. Flowers: Late June-Early August	NO
Nelson's Milkvetch	<i>Astragalus nelsonianus</i>	Habitat: Alkaline, seleniferous erodible slopes, shale bluffs, ridgetops, valleys and flats. Sparsely vegetated sagebrush /rabbitbrush/shadscale. Distribution: Fremont, Natrona, and Sweetwater counties. Elevation: 5,200-7,600'. Substrate: Poorly developed soils, loess, lacustrine deposits. Flowers: June	NO
Porter's Sagebrush	<i>Artemisia porter</i>	Habitat: Sparsely vegetated clay flats, gullies, depressions and badlands. Distribution: Wind River and Powder River basins, known in Fremont, Johnson and Natrona counties. Elevation: 5,000-7,000'. Substrate: Pale whitish or red/green silty loams derived from shales or consolidated volcanic ash. Flowers: June-July.	NO
William's Waferparsnip	<i>Cymopterus williamsii</i>	Habitat: Open S/E facing ridge tops with exposed limestone outcrops or talus, and low grass cover. Elevation: 6,000-8,300'. Distribution: Bighorn Mountains in Bighorn, Johnson, Natrona and Washakie counties. Substrate: Thin, sandy soils with barren rock. Flowers: May-June	NO

¹ Descriptions are from the following sources: Fertig 2000a, 2000b, 2002, 2006, and 2007, Heidel 2003, Marriot and Pokorny 2006.

angustifolia), musk thistle (*Carduus nutans*) and Canada thistle (*Cirsium arvense*). Other non-native invasive species observed included bull thistle (*Cirsium vulgare*), cheatgrass (*Bromus tectorum*), Japanese brome (*Bromus japonicus*), Russian thistle (*Salsola tragus*), curlycup gumweed (*Grindelia squarrosa*), lambsquarters (*Chenopodium album*), and chicory (*Cichorium intybus*). Most weeds occurred at low densities except for Canada thistle, which occurred in very dense patches along the

Table 3-4. Invasive, Non-native Plant Species (Noxious Weeds) within Wyoming¹

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>Tamarix</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.

riparian corridors. In general, weeds were observed either in riparian corridors or along roads.

3.6 Soils

The existing third order soil inventory of Converse County, Wyoming, Northern Part (Survey Area WY709) published by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS 2012), was used to evaluate the soil resources within the SFD project area. 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 within and adjacent to the SFD project area and the soils in the 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 and high intensity/short duration summer thunderstorm events. The soils inventory identified 35 soil map units (Table 3-5) within the SFD project area.

Table 3-5. NRCS Soil Map Units and Map Unit Names within the Scott Field Development

NRCS Soil Map Unit #	Map Unit Name	Acreage within Project
101	Absted-Arvada-Bone complex, 0 to 6 percent slopes	941
102	Aeric Haplaquents, 0 to 3 percent slopes	15
103	Bahl-Savageton complex, 0 to 6 percent slopes	620
105	Cambria-Cushman complex, 6 to 15 percent slope	157
108	Clarkelen-Dwyer-Orpha association, 0 to 10 percent slopes	1,068
109	Clarkelen-Haverdad-Bigwinder complex, 0 to 3 percent slopes	526
111	Cushman-Terro complex, 6 to 15 percent slopes	75
112	Cushman-Worf association, 6 to 15 percent slopes	191
113	Dwyer-Orpha loamy sands, 3 to 15 percent slopes	19
114	Forkwood-Cambria fine sandy loams, 0 to 6 percent slopes	821
115	Forkwood-Cambria-Cushman complex, 6 to 15 percent slopes	878
116	Forkwood-Ulm complex, 0 to 6 percent slopes	1,857
117	Forkwood-Ulm-Renohill complex, 6 to 15 percent slopes	811
119	Gullied Land	1,416
120	Haverdad-Lohmiller complex, 0 to 6 percent slopes	93
121	Hiland-Bowbac sandy loams, 0 to 6 percent slopes	2,174
122	Hiland-Bowbac complex, 6 to 15 percent slopes	14,766
128	Renohill-Worfka-Shingle complex, 6 to 15 percent slopes	213
129	Samday-Shingle-Worf complex, 3 to 15 percent slopes	1,386
131	Shingle-Badland-Samday complex, 10 to 30 percent slopes	869
133	Shingle-Theedle-Cambria association, 6 to 30 percent slopes	12
134	Silhouette-Heldt association, 0 to 6 percent slopes	31
135	Tassel-Shingle complex, 2 to 30 percent slopes	1,320
136	Tassel-Terro-Rock outcrop complex, 15 to 30 percent slopes	88
137	Tassel-Tullock-Vonalee association, 6 to 30 percent slopes	3,461
139	Terro-Tullock-Orpha complex, 6 to 15 percent slopes	222
141	Theedle-Kishona loams, 6 to 15 percent slopes	236
142	Ulm-Bidman complex, 0 to 6 percent slopes	1,421
143	Ulm-Renohill complex, 0 to 6 percent slopes	630
144	Ulm-Renohill clay loams, 6 to 15 percent slopes	1,529
145	Ustic Torriorthents, reclaimed, 3 to 30 percent slopes	29
149	Worf-Shingle-Tassel complex, 3 to 30 percent slopes	6,146
150	Zigweid-Bahl association, 0 to 6 percent slopes	322
151	Zigweid-Cambria association, 0 to 6 percent slopes	132
152	Zigweid-Cambria-Theedle association, 6 to 15 percent slopes	120

(Source: NRCS, Accessed August, 2012)

Note: Note: Acreages calculations are based on NRCS soil series acreages, which resulted in a project area total that is slightly different than the SRC calculated project area.

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. Chemical characteristics that limit the suitability of a soil for reclamation include pH, calcium carbonate content, sodium content, and elevated salinity. All soils within the SFD project area are slightly or moderately alkaline with alkalinity generally increasing with depth. Calcium carbonate generally increases with increasing depth and is relatively high in deeper horizons for most of soil series present in the SFD project area. Sodium content affects the structure of the soil and results in a decreased infiltration rate at the surface and decreased permeability at lower depths in the soil profile. Elevated salinity levels affect the plants' ability to take up water and therefore could make revegetation difficult in some areas.

All of the series within the SFD project area are susceptible to wind and water erosion to some extent (Table 3-6). A majority of the soil series (21 of 30) have a moderate wind erosion hazard, six soil series are rated as having severe wind erosion hazard, and three have a slight wind erosion hazard. A majority of the soil series (22 of 30) have a moderate water erosion hazard, six have a slight water erosion hazard, and two soil series are rated as having severe water erosion hazard. Surface runoff potentials vary greatly and generally increase with increasing slope.

Dry soils with well-developed structure are typically more resistant to compaction. Nineteen of the 30 soil series present in the SFD project area are generally more susceptible to soil compaction and are classified as sandy loams, loams, and sandy clay loams (NRCS 2001).

Additional information regarding the soils present in the SFD project area can be found in the third order soil inventory of Converse County, Wyoming, Northern Part (NRCS 2012).

3.7 Water Resources

The existing water quality and use of groundwater and surface water of the SFD project area are discussed in this section.

3.7.1 Surface Water

The entire SFD project area lies within the 641,900-acre Lightning Subbasin (Hydrologic Unit Code (HUC) 10120105). The primary surface water feature within this subbasin is Lightning Creek, which is a tributary to Lance Creek, which in turn is a tributary to the Cheyenne River. Locally, the northern portion of the SFD project area is drained by Box Creek, which joins Lightning Creek approximately 9 miles to the east near the Converse County – Weston County line. Tributaries of Box Creek include North Fork Box Creek, South Fork Box Creek, Bobby Draw, Bowman Draw, and Gumbo Draw. The southern portion of the SFD project area is drained by Lightning Creek and its tributary Little Lightning Creek. Surface water drainages and

Table 3-6. Wind and Water Erosion Hazard Ratings and Surface Runoff and Reclamation Potential within the SFD Project Area

Soil Series	Hazard of Water Erosion	Hazard of Wind Erosion	Surface Runoff Potential	Reclamation Potential
Absted	severe	severe	slow-medium	poor
Aeric Haplaquept	slight	slight	very slow	poor
Arvada	severe	severe	high-very high	poor
Bahl	moderate	moderate	slow-medium	poor
Bidman	moderate	moderate	medium	fair
Bigwinder	moderate	moderate	medium	fair
Bone	moderate	moderate	slow-medium	poor
Bowbac	moderate	moderate	medium-slow	fair
Cambria	moderate	moderate	medium	fair
Clarkelen	moderate	moderate	slow-very slow	good
Cushman	moderate	moderate	medium	fair
Dwyer	moderate	severe	slow	poor
Forkwood	slight	moderate	slow	fair
Haverdad	slight	moderate	slow	fair
Hiland	slight	moderate	slow	fair
Kishona	moderate	moderate	medium-slow	fair
Lohmiller	moderate	moderate	slow-medium	fair
Orpha	moderate	moderate	slow-very slow	poor
Renohill	moderate	moderate	medium	fair
Samday	moderate	moderate	medium-high	poor
Savageton	moderate	moderate	medium	poor
Shingle	moderate	slight	medium	poor
Tassel	moderate	severe	slow-medium	poor
Terro	moderate	moderate	slow-medium	fair
Theedle	moderate	moderate	medium	fair
Tullock	slight	severe	slow	poor
Ulm	moderate	slight	slow	fair
Vonalee	slight	severe	slow	poor
Worf	moderate	moderate	medium-high	poor
Zigweid	moderate	moderate	medium	fair

Source: NRCS (2012)

HUC boundaries associated with the SFD project area are indicated on Figure 3-2. The streams within the SFD project area are ephemeral (flow only in direct response to rainfall or snowmelt) or intermittent (flowing water during certain times of the year when groundwater provides water for stream flow); no perennial streams are present in the SFD project area. No portion of the SFD project area is within the North Platte Basin (Figure 3-2).

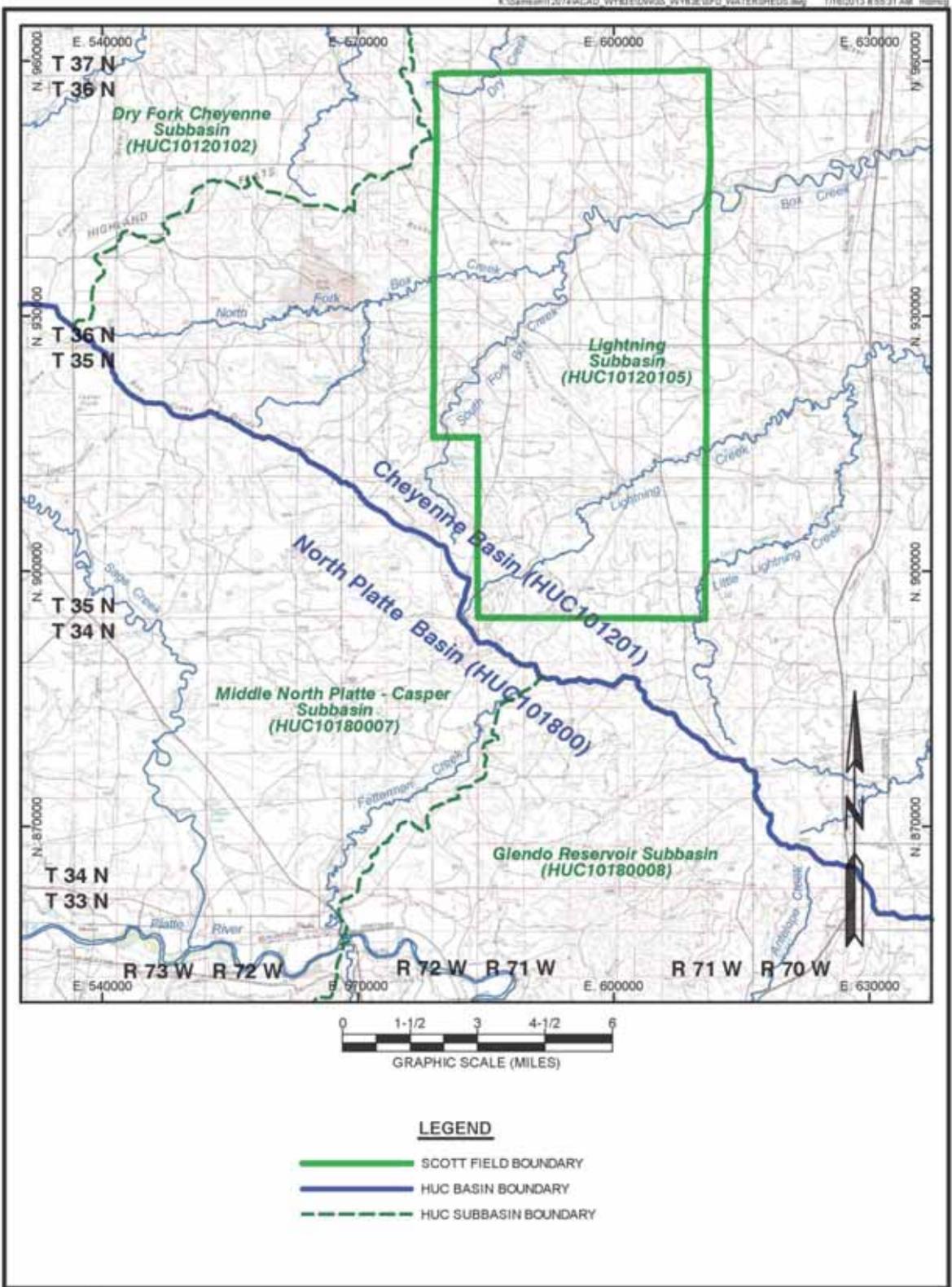


Figure 3-2. Surface Water Drainages and HUC Boundaries Associated with and Adjacent to the SFD Project Area

One natural spring was identified on U.S. Geological Survey (USGS) quadrangle maps within a 1-mile radius of SFD project area. WSEO records indicate that there are 10 flowing wells within the SFD project area.

3.7.1.1 Surface Water Use

As of September 2012, a total of seven permitted surface water rights were on record within the SFD project area (WSEO 2012). Five of these are reservoirs permitted for stock use, totaling 75.3 ac-ft of capacity. One is a reservoir with a capacity of 67.61 ac-ft permitted for temporary industrial use. One permit is a direct-flow right for 1.6 cfs diverting from Box Creek for irrigation. Stock use was associated with six of the surface water rights. One surface water right was associated with temporary use/industrial/combo. A list of valid surface-water rights is included in Table 3-7.

3.7.1.2 Surface Water Quality

Historic water quality and flow data are available for Box Creek and stream flow data, water quality, and sample records for Lightning Creek are also available (Table 3-8). Water quality data for Little Lightning Creek are currently not available.

Box Creek, Lightning Creek and Little Lightning Creek have been classified by WDEQ as Class 3B (WDEQ/WQD 2001). Class 3B waters are described by the WDEQ as tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. In general 3B waters are characterized by frequent linear wetland occurrences or impoundments within or adjacent to the stream channel over its entire length. No other streams within the SFD project area have been classified by WDEQ.

3.7.1.3 Wetlands/Riparian

According to National Wetlands Inventory (NWI) mapping, approximately 308 acres wetlands are present within the SFD project area (Table 3-9). A majority of these wetlands are present along narrow bands of Lightning and Box creeks and associated with small stock water reservoirs.

3.7.2 Groundwater

Groundwater resources in the project area include unconfined (water table) and confined aquifers. The unconfined aquifers are generally shallow, blanket-type deposits of Quaternary or Tertiary age and are generally found within 400–600 feet of the ground surface. Alluvial deposits fall into this category. Confined aquifers are overlain by relatively impermeable rocks and are generally in the deeper formations, such as the Mesaverde Group.

As described by Morris (1956), the stratified rocks cropping out at the surface in the area of study are those of the Fort Union and Wasatch Formations of Tertiary age. They are underlain by the Lance Formation of Late Cretaceous age, which generally

Table 3-7. Surface Water Rights for the SFD Project Area

Permit No.	TNP	RNG	SEC	USE	Facility name	Applicant	Priority	Annual Appropriated Amount (ac-ft)	Source
P7944S	35N	71W	23	STO	Panhandle Stock Reservoir	Mortons Incorporated	1/27/1975	4.9	Panhandle Draw
P5071R	35N	71W	32	STO	Morton's Inc. No. 2 Reservoir	Mortons Incorporated	6/2/1939	26	Duffy Draw
P4258S	35N	71W	35	STO	Dead Horse No. 1 Stock Reservoir	Kenneth Ivester	3/20/1964	13.66	Little Lightning Creek
P4399S	36N	71W	8	STO	Box Creek Butte #1 Stock Reservoir	Mortons, Inc.	09/28/1961	6.1	Box Creek Butte Draw
P19267D	36N	71W	18	IRR,STO	Kuykendall Ditch	G.C. Kuykendall	11/21/1939	1.6	Box Creek
P8693R	36N	71W	34	TEM,IND	Cannon Land and Livestock Production Water Disposal System Reservoir	Cannon Land & Livestock, LTD.	7/8/1983	67.61	Oil well produced water ¹
P5072R	36N	72W	13	STO	Morton's Inc. No. 3 Reservoir	Mortons, Inc.	6/2/1939	24.61	Gumbo Draw

¹ This reservoir is permitted for evaporation of produced water. In the event that the quality of water stored is deemed acceptable for other purposes, proper and timely authorization must be obtained beforehand.

Table 3-8. Surface Water Quality for Selected Sites within and near the SFD Project Area

Reporting Agency	USGS				WDEQ		
Station ID	430433105234301 (Box Creek)	430435105233700 (Box Creek)	430609105163901 (Box Creek)	430718105002301 (Lightning Creek)	NPG186 (Lightning Creek)	NPG201 (Lightning Creek)	WDEQ-0002 (Lightning Creek)
Location	T36N R71W S20	T36N R71W S20	T36N R70W S8	T36N R68W S3	T37N R65W S4	T37N R67W S20	T37N R65W S4
Sample period	1980	1978	1980	1980	2004/05	2006	2004
Parameter							
Bicarbonate	nm	350 ⁽¹⁾	nm	nm	nm	nm	nm
Calcium	85.5 ⁽²⁾	82 ⁽¹⁾	nm	nm	nm	nm	6.66 ⁽¹⁾
Carbon Dioxide	nm	3.5 ⁽¹⁾	nm	nm	nm	nm	nm
Carbonate	nm	0 ⁽¹⁾	nm	nm	nm	nm	nm
Chloride	9.2 ⁽²⁾	11.0 ⁽¹⁾	nm	nm	13.5 ⁽²⁾	17.0 ⁽¹⁾	0.46 ⁽¹⁾
Fluoride	0.2 ⁽²⁾	0.3 ⁽¹⁾	nm	nm	nm	nm	nm
Hardness	355 ⁽²⁾	340 ⁽¹⁾	nm	nm	382 ⁽²⁾	351 ⁽¹⁾	
Magnesium	34.5 ⁽²⁾	33 ⁽¹⁾	nm	nm	nm	nm	7.57 ⁽¹⁾
Iron, µg/L	15 ⁽²⁾	30 ⁽¹⁾	nm	nm	nm	nm	nm
Nitrite + Nitrate (Total)	0.02 ⁽¹⁾	0.1 ⁽¹⁾	nm	nm	nm	nm	nm
Noncarbonate Hardness	100 ⁽²⁾	54 ⁽¹⁾	nm	nm	nm	nm	nm
pH, SU	8.02 ⁽⁵⁾	8.2 ⁽⁵⁾	9.1 ⁽¹⁾	nm	8.38 ⁽⁵⁾	8.19 ⁽¹⁾	8.22 ⁽¹⁾
Turbidity, JCU	6.25 ⁽⁴⁾	3 ⁽⁴⁾	20 ⁽¹⁾	nm	16.93 ⁽⁴⁾ ¹	98.3 ⁽¹⁾ ¹	6.82 ⁽¹⁾ ¹
Dissolved Oxygen	9.9 ⁽²⁾		11.2 ⁽²⁾		9.38 ⁽²⁾	7.32 ⁽¹⁾	7.70 ⁽¹⁾
Discharge (Inst) cfs	0.23 ⁽²⁾	0.23 ⁽¹⁾	nm	0.12 ⁽¹⁾	nm	nm	nm
Potassium	3.85 ⁽²⁾	5.5 ⁽¹⁾	nm	nm	nm	0.22 ⁽¹⁾	0.22 ⁽¹⁾
Sodium	120 ⁽²⁾	140 ⁽¹⁾	nm	nm	nm		21.94 ⁽¹⁾
Conductance, umhos/cm	1,090 ⁽⁶⁾	1,190 ⁽¹⁾	4,550 ⁽²⁾	1,400 ⁽¹⁾	2,765 ⁽²⁾	2,100 ⁽¹⁾	3,273 ⁽¹⁾
Sulfate	365 ⁽²⁾	340 ⁽¹⁾	nm	nm	1,227 ⁽²⁾	7,000 ⁽¹⁾	33.39 ⁽¹⁾

Notes: mg/L except as noted. (Parentheses indicate the number of samples)
 nm - not measured
 JCU - Jackson Candle Unit
 SU - Standard Unit

Table 3-9. NWI Delineated Wetlands within the SFD Project Area

Wetland Type	Code	Acres
Freshwater Pond	PABFh	12.68
Freshwater Emergent Wetland	PEMA/PEMAh/PEMC/PEMC/PEMCh	275.36
Freshwater Forested/Shrub Wetland	PFOA/PSSB/PSSC	3.76
Freshwater Pond	PUBF _x /PUSA _h /PUSA _x /PUSCh/PUSC _x	16.31
Total		308.11

Source: National Wetland Inventory (NWI 2013)

lies at too great a depth in the area studied to be considered a possible source of ground water. The formations dip gently eastward from the Bighorn Mountains on the west, westward from the Black Hills on the east, and northward from the Laramie Range on the south. The rocks are of fresh water origin, having been deposited in inland lakes and marshes and on extensive flood plains.

The Eocene Age Wasatch Formation is found at the surface throughout the SFD project area. Recent Alluvium is located along stream courses. The thickness of the Wasatch Formation ranges from 1,000 to 2,000 feet in the center of the Powder River Basin and thins to zero at the basin margins. Underlying the Wasatch Formation is the Paleocene Age Fort Union Formation, which ranges between 2,000 and 3,000 feet in thickness. Underlying the Fort Union Formation is the Upper Cretaceous Age Lance Formation, which is roughly 2,500 feet thick. Beneath the Lance Formation is the Fox Hills Sandstone, which overlies the Lewis Shale, a regional confining unit. The target formations for commercial oil and gas production include the Sussex, Shannon, Frontier, Muddy, Mowry, Niobrara, and Dakota, at vertical depths between 9,500 and 13,000 feet.

The thickness of the Wasatch Formation within the SFD project area is not known. The boundary between the Wasatch and Fort Union formations is an erosional unconformity (a surface that separates older, eroded rocks from younger, overlying sediments). Locally, the top of the Badger coal seam, which was mined to the west in T36N, R75W at the now closed Dave Johnston Mine, marks the top of the Fort Union Formation, but the Badger coal seam does not continue into the SFD project area, making the contact between the Wasatch and Fort Union formations difficult to discern. Based on logs of water wells completed in the project area, most wells are completed in sands of the upper Tongue River Member of the Fort Union Formation, although wells less than 100 feet deep are likely completed in the Wasatch Formation. The Tongue River Member consists of interbedded sandstone and shale. Typical stock wells, although variable in depth, generally utilize one or more water-bearing sandstone lenses as a source of supply.

3.7.2.1 Groundwater Use

The majority of groundwater wells within the SFD area utilize the Tongue River Member of the Fort Union Formation which extends to approximately 1,000 feet in depth.

There are 40 non-industrial related wells registered with the WSEO within the SFD project area. A breakdown of these valid well permits is as follows:

- 34 Wells used for stock;
- 3 Wells used for miscellaneous purposes;
- 2 Wells listed as dual purpose;
- 1 Well used for domestic purposes.

A complete list of valid non-monitoring related groundwater rights is included in Table 3-10.

3.7.2.2 Groundwater Quality

Groundwater quality samples were collected at four water wells in the SFD project area (Table 3-11). For the most part, comparisons between groundwater quality within the different structural features in the project area are difficult given the large variation in water quality within the features. In general, the quality of the groundwater underlying the Powder River Basin is largely related to the depth of the aquifer, the type of strata in the saturated zone, the recharge rate and volume at the area sampled, and the residence time of the groundwater in the aquifer. Typically, quality of groundwater within a given hydrogeologic unit usually deteriorates with depth. The two shallow wells would qualify as Class I (domestic) wells under the WDEQ/WQD water quality standards. The two deep wells would qualify as Class IV (industrial) wells under the WDEQ/WQD water quality standards.

3.8 Wildlife

3.8.1 Big Game

Two big game species are known to occur within the SFD project area: pronghorn antelope (*Odocoileus hemionus*) and mule deer (*Antilocapra americana*). The entire SFD project area is classified as outside of white-tailed deer (*Odocoileus virginianus*) distribution and is not within a designated elk (*Cervus elaphus*) herd unit. All big game populations are managed by the Wyoming Game and Fish Department (WGFD) within areas designated as herd units.

The SFD project area occurs within the North Converse Pronghorn Herd Unit (PR748) with 26,218 acres (59%) classified as yearlong seasonal range and 18,401 acres (41 percent) classified as winter yearlong pronghorn seasonal range. Yearlong seasonal range is defined as an area where a population or portion of a population of animals makes general use of the habitat on a year-round basis. Winter yearlong seasonal

Table 3-10. Groundwater Rights within the SFD Project Area

Permit No.	TNP	RNG	SEC	QQ	Uses	Facility Name	Applicant	Priority	Yield (GPM)	Total Depth
P35198W	35N	71W	01	SWNW	STK	Anderson #1	Boner Brothers Partnership	10/22/1976	5	137
P45114W	35N	71W	02	NWNW	STK	Machine Pasture #122	Boner Brothers Partnership	09/13/1978	10	1,520
P22358P	35N	71W	04	NWNW	STK	Middle Well	Boner Brothers Partnership	10/10/1947	5	175
P49342W	35N	71W	07	NWSE	STK	Pipe Spring #125	Boner Brothers Partnership	08/03/1979	25	1,000
P97476W	35N	71W	10	SWSE	STK	Read Well #1	Boner Brothers Partnership	10/14/1994	5	150
P97477W	35N	71W	10	SWSE	STK	Read Well #2	Boner Brothers Partnership	10/14/1994	5	150
P20470W	35N	71W	13	NENE	STK	Lightning Creek Artesian #103	Boner Brothers Partnership	01/11/1973	4	700
P22371P	35N	71W	17	NENE	STK	Lightning Creek	Boner Brothers Partnership	09/25/1956	5	200
P22377P	35N	71W	23	SESE	STK	Middaugh #67	Boner Brothers Partnership	09/07/1963	5	208
P22306P	35N	71W	25	SESE	STK	Ivester #110	Canon Land & Livestock Ltd.	10/30/1964	5	268
P22307W	35N	71W	26	SESW	STK	Rock Barn #111	Canon Land & Livestock Ltd.	12/29/1972	4	204
P22379P	35N	71W	27	NWNE	STK	NW of Clausen	Boner Brothers Partnership	09/08/1964	5	148
P22375P	35N	71W	30	SESE	STK	Bum Pasture	Boner Brothers Partnership	07/31/1962	4	166
P22361P	35N	71W	30	SWNE	STK	Lightning Divide	Boner Brothers Partnership	08/30/1953	5	215
P22383P	35N	71W	33	NWSW	STK	Edwards #97	Boner Brothers Partnership	12/31/1966	4	120
P45115W	35N	71W	35	NENW	STK	North Fork #123	Canon Land & Livestock Ltd.	09/13/1978	9	1300
P97478W	35N	71W	36	NESE	DOM_GW; STK	Clausen State #1	Boner Brothers Partnership	10/14/1994	5	480
P22362P	36N.	71W	01	NESE	STK	Ballard House #37-1	Canon Land & Livestock Ltd.	12/31/1954	4	200
P22376P	36N.	71W	02	NENW	STK	East Ballard #60	Canon Land & Livestock Ltd.	07/31/1962	5	249
P22365P	36N.	71W	04	NESE	STK	Ballard #4, #37-4	Canon Land & Livestock Ltd.	12/31/1954	3	215
P159488W	36N.	71W	06	SWNE	STK	South Ballard #2	Boner Brothers Partnership	06/08/2004	15	
P194967W	36N.	71W	08	SESE	MIS	Enl. Lund #2	FRED AND BETTY LUND	02/07/2011	50	
P167447W	36N.	71W	08	SWSE	STK, MIS	Lund #2	FRED AND BETTY LUND	05/06/2005	1.5	155
P22367P	36N.	71W	10	NESE	STK	Ballard #6, #37-6	Canon Land & Livestock Ltd.	12/31/1954	4	230
P22366P	36N.	71W	11	NWSE	STK	Ballard #5, #37-5	Canon Land & Livestock Ltd.	12/31/1954	5	200
P22380P	36N.	71W	12	NENW	STK	HitsheW #84	Canon Land & Livestock Ltd.	04/06/1965	6	170
P21572P	36N.	71W	13	SWNE	STK	Johnson Flow #7	Jake Johnson, Inc.	12/31/1946	18	210
P21573P	36N.	71W	13	NESW	STK	Johnson Flow #8	Jake Johnson, Inc.	12/31/1950	10	270
P22382P	36N.	71W	18	NWNE	STK	East Antone #94	Boner Brothers Partnership	08/05/1966	6	200
P126225W	36N.	71W	20	SENW	STK	Boland #1	Michael R. & Thomas J. Boland	06/21/2000	2	140

Table 3-10. Groundwater Rights within the SFD Project Area (Cont.)

Permit No.	TNP	RNG	SEC	QQ	Uses	Facility Name	Applicant	Priority	YLD	TD
P21574P	36N.	71W	23	SENW	STK	Johnson Flow #9	Jake Johnson, Inc.	12/31/1955	15	260
P21555P	36N.	71W	26	SWSE	STK	Jake Johnson #6	Jake Johnson, Inc.	08/01/1946	7.5	150
P128950W	36N.	71W	31	SWSW	DOM_GW	Bull Pasture	Boner Brothers Partnership	09/01/2000	15	80
P103911W	36N.	71W	31	NWSE	STK	Box Creek #3	Boner Brothers Partnership	09/18/1996	10	80
P22359P	36N.	71W	34	NWSW	STK	Kuykendall #15	Canon Land & Livestock Ltd.	10/10/1947	3	136
P173074W	36N.	71W	36	SENW	MIS	Johnson - State #26	Jake Johnson., Inc.	02/13/2006	7	280
P22374P	36N.	72W	01	NENE	STK	Irwin Dike	Boner Brothers Partnership	08/16/1960	3	75
P198163W	36N.	72W	12	NWNE	MIS	Antone 1-12	Boner Bros. Partnership	06/01/2012	150	
P99382W	36N.	72W	12	NENE	STK	Antone #3	Boner Bros. Partnership	06/13/1995	5	402
P22372P	36N.	72W	12	SWSE	STK	Antone #40	Boner Brothers Partnership	08/28/1959	5	150

GPM = Gallons per Minute, TD = Total Depth

Table 3-11. Groundwater Quality for Selected Wells within the SFD Project Area

Well Name	Box Creek #3	Bull Pasture	8 Federal W-67675	8 Federal W-67675
Permit Number	P103911W	P128950W	049-09-21939	049-09-22372
Location	SWSW Sec 31 T.36N., R.71W	NWSE Sec 31 T.36N., R.71W	NESE Sec 6 T.36N., R.71W	NESE Sec 6 T.36N., R.71W
Sample Collection Date	8-15-12	8-15-12	11-24-24/ 11-06-91	11-24-24/ 11-06-91
Parameters				
Bicarbonate (HCO ₃)	172 ₍₁₎	260 ₍₁₎	1,280 ₍₂₎	1,798 ₍₂₎
Calcium	28 ₍₁₎	80 ₍₁₎	30 ₍₂₎	50 ₍₂₎
Chloride	nd	6 ₍₁₎	8,833 ₍₂₎	5,698 ₍₂₎
Alkalinity (CaCO ₃)	149 ₍₁₎	218 ₍₁₎	--	--
Magnesium	5 ₍₁₎	25 ₍₁₎	9 ₍₂₎	8 ₍₂₎
Iron	nd	0.17	6.6 ₍₂₎	12.9 ₍₂₎
Nitrite + Nitrate (Total)	nd	nd	--	--
pH, SU	8.25 ₍₁₎	7.49 ₍₁₎	8.1 ₍₂₎	6.93 ₍₂₎
TDS	490 ₍₁₎	500 ₍₁₎	15,728 ₍₂₎	11,441 ₍₂₎
Potassium	3.1 ₍₁₎	5.0 ₍₁₎	132 ₍₂₎	27 ₍₂₎
Sodium	125 ₍₁₎	45 ₍₁₎	6,246 ₍₂₎	11,113 ₍₂₎
Conductance, umhos/cm	734 ₍₁₎	722 ₍₁₎	--	--
Sulfate	210 ₍₁₎	170 ₍₁₎	4.8 ₍₂₎	0 ₍₂₎
Total Depth (Ft)	80	80	8,852 ₍₂₎	9,850 ₍₂₎

Notes: mg/L except as noted. (Parentheses indicate the number of samples)
nd – not detected

range is defined as an area where animals make general use of the habitat on a year-round basis, but during winter months there is a significant influx of additional animals into the area from other seasonal ranges. No critical ranges or migration corridors for pronghorn occur within the SFD project area (WGFD 2011).

The SFD project area is within the North Converse Mule Deer Herd Unit (MD755), which borders the Cheyenne River Herd Unit (MD740) (east of the project area boundary). The SFD project area is classified as either yearlong or winter yearlong mule deer seasonal range. Approximately 36,485 acres (82 percent) of the project area are designated as yearlong seasonal range and 8,134 acres (18 percent) are designated as winter yearlong seasonal range. No critical ranges or migration corridors for mule deer occur within the project area.

3.8.2 Migratory Birds

Habitats in the SFD project area are primarily composed of upland grassland (short grass prairie) with scattered sagebrush (sagebrush steppe). Cottonwood riparian habitat occurs along the larger drainages. Box and Lightning creeks flow through the SFD project area and contain isolated pools that persist late into the growing season (HWA 2012). A variety of migratory birds may utilize these habitat communities and creeks located within or near the project area during spring/fall migrations. The Partners in Flight organization is a collaborative effort between federal, state, and local government agencies, along with other non-governmental agencies, that aims to emphasize and enhance the conservation of birds. The Wyoming Partners in Flight (WPIF) has identified priority species potentially occurring in the shortgrass prairie and sagebrush steppe habitat types, some of which could occur in the project area (Table 3-12). Raptors, along with Threatened, Endangered, or Sensitive Species may be included in Table 3-12 but are discussed in greater detail in following sections.

3.8.3 Raptors

There has not been a complete comprehensive inventory of raptor species within the SFD project area boundary, primarily due to restricted access to private land. According to field surveys conducted by HWA (2012), as well as the Wildlife Observation System (WOS; WGFD 2012) and the WYNDD species observation databases (WYNDD 2012), eight raptor species have been documented on or within 6 miles of the project area since 2000: American kestrel (*Falco sparverius*), bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk (*Buteo regalis*), great horned owl (*Bubo virginianus*), golden eagle (*Aquila chrysaetos*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), and Swainson's hawk (*Buteo swainsoni*). HWA (2012) documented and confirmed 49 raptor nests on or within 0.5 mile of the project area (Figure 3-3 and Table 3-13). The 49 nests include: one American kestrel nest, 14 ferruginous hawk nests, seven golden eagle nests, one great horned owl nest, eight red-tailed hawk nests, three Swainson's hawk nests, and 15 unknown raptor nests.

3.8.4 Threatened and Endangered Wildlife

According to the USFWS, there are six species of mammals, birds, and fish that could occur in Converse County, Wyoming that are currently listed as Endangered Threatened, or Candidate species (Table 3-14). Currently, the black-footed ferret (*Mustela nigripes*) is not listed in this county, thus it is not discussed in the text (USFWS 2012).

The Preble's meadow jumping mouse is currently listed as threatened. Typical habitat for Preble's meadow jumping mouse is characterized as being at elevations above 5,900 feet mean sea level, within an upland landcover of forest or shrub-dominated riparian vegetation, lodgepole pine, and/or mixed grass prairie closely associated with open or flowing water (Smith et al. 2004). WYNDD has modeled potential Preble's

Table 3-12. Migratory Birds Classified as Priority Species by WPIF that May Occur within the SFD Project Area

Common Name	Scientific Name	Habitat Classification
Loggerhead shrike	<i>Lanius ludovicianus</i>	Shrub-steppe
Sage thrasher	<i>Oreoscoptes montanus</i>	Shrub-steppe
Vesper sparrow	<i>Pooecetes gramineus</i>	Shrub-steppe
Lark sparrow	<i>Chondestes grammacus</i>	Shrub-steppe
Lark bunting	<i>Calamospiza melanocorys</i>	Shortgrass Prairie and Shrub-steppe
Grasshopper sparrow	<i>Ammodramus savannarum</i>	Shortgrass Prairie and Shrub-steppe
Chestnut collared longspur	<i>Calcarius ornatus</i>	Shortgrass Prairie
Diskcissel	<i>Spiza americana</i>	Shortgrass Prairie
McCown's longspur	<i>Calcarius mccownii</i>	Shortgrass Prairie and Shrub-steppe
Ferruginous hawk	<i>Buteo regalis</i>	Shrub-steppe and Shortgrass Prairie
Greater sage-grouse	<i>Centrocercus urophasianus</i>	Shrub-steppe and Shortgrass Prairie
Mountain plover	<i>Charadrius montanus</i>	Shrub-steppe and Shortgrass Prairie
Upland sandpiper	<i>Bartramia longicauda</i>	Shortgrass Prairie
Long-billed curlew	<i>Numenius americanus</i>	Shortgrass Prairie and Meadows
Burrowing owl	<i>Athene cunicularia</i>	Shortgrass Prairie
Short-eared owl	<i>Asio flammeus</i>	Shortgrass Prairie and Meadows
Brewer's sparrow	<i>Spizella breweri</i>	Shrub-steppe and Mountain-foothills Shrub
Sage sparrow	<i>Amphispiza belli</i>	Shrub-steppe and Mountain-foothills Shrub
Baird's sparrow	<i>Calcarius mccownii</i>	Shrub-steppe and Shortgrass Prairie
Swainson's hawk	<i>Buteo swainsoni</i>	Plains/Basin Riparian
Bald eagle	<i>Haliaeetus leucocephalus</i>	Riparian/Forested
Golden eagle	<i>Aquila chrysaetos</i>	Shrub-steppe and Shortgrass Prairie

meadow jumping mouse habitat in Wyoming with the Preble's mapped as having a "very low probability of occurrence" within the SFD project area. This species is unlikely to occur within the SFD project area based on WYNDD's habitat model.

The greater sage-grouse is currently listed as a candidate species under the Endangered Species Act. Habitat loss and degradation, as well as loss of population connectivity, have been identified as factors contributing to the region-wide decline of

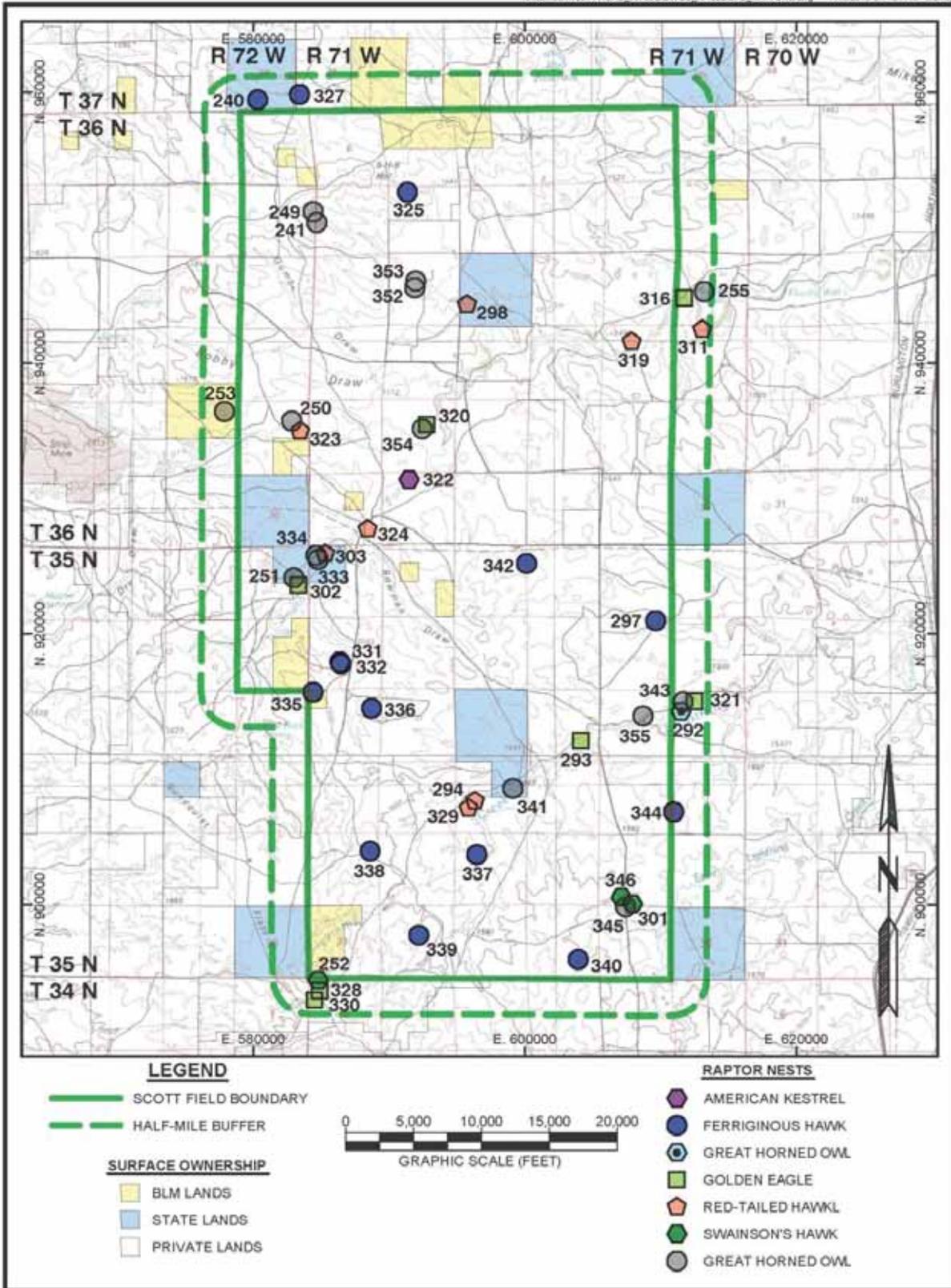


Figure 3-3. Raptor Nests within and Adjacent to the SFD Project Area

Table 3-13. Raptor Nest Status within and adjacent to the SFD Project Area

HWA ID	BLM ID	Species ¹	Status ²	Condition	Substrate ³	Surface Owner	Legal Location		
							S	T	R
240	377236SWSE01	FH	I	Fair	ROK	State	36	37	72
241	367107NWSW01	UNK	I	Fair	DEC	Private	7	36	71
249	5195	UNK	G	Gone	DEC	Private	7	36	71
250	5196	UNK	G	Gone	DEC	Private	25	36	72
251	5197	UNK	G	Gone	DEC	State	1	35	72
252	5198	SH	G	Gone	DEC	Private	6	34	71
253	5426	UNK	G	Gone	DEC	BLM	26	36	72
255	No ID	UNK	I	Fair	DEC	Private	13	36	71
292	No ID	GHO	P	Fair	DEC	Private	13	35	71
293	No ID	GE	A	Good	DEC	Private	15	35	71
294	No ID	RTH	A	Excellent	DEC	Private	21	35	71
297	No ID	FH	I	Fair	GND	Private	11	35	71
298	No ID	RTH	A	Good	DEC	State	16	36	71
301	No ID	SH	V	Good	DEC	Private	26	35	71
302	No ID	GE	I	Fair	DEC	Private	1	35	72
303	No ID	RTH	A	Excellent	DEC	State	6	35	71
311	No ID	RTH	A	Excellent	DEC	Private	24	36	71
316	No ID	GE	I	Fair	DEC	Private	13	36	71
319	No ID	RTH	A	Excellent	DEC	Private	23	36	71
320	No ID	GE	F	Excellent	DEC	Private	29	36	71
321	No ID	GE	A	Excellent	DEC	Private	13	35	71
322	No ID	AK	I	Good	DEC	Private	32	36	71
323	No ID	RTH	F	Dilapidated	DEC	Private	25	36	72
324	No ID	RTH	A	Good	DEC	Private	31	36	71
325	No ID	FH	I	Good	ROK	Private	8	36	71
327	No ID	FH	A	Excellent	ROK	Private	31	37	71
328	No ID	GE	F	Good	DEC	Private	6	34	71
329	No ID	RTH	I	Good	DEC	Private	21	35	71
330	No ID	GE	I	Good	DEC	Private	6	34	71
331	No ID	FH	I	Fair	GND	Private	7	35	71
332	No ID	FH	I	Fair	GND	Private	7	35	71
333	No ID	UNK	I	Good	DEC	State	6	35	71
334	No ID	UNK	I	Good	DEC	State	6	35	71
335	No ID	FH	I	Poor	LOW	BLM	18	35	71
336	No ID	FH	I	Poor	LOW	Private	18	35	71
337	No ID	FH	I	Poor	LOW	Private	28	35	71
338	No ID	FH	I	Fair	LOW	Private	30	35	71
339	No ID	FH	I	Poor	LOW	Private	32	35	71
340	No ID	FH	I	Remnants	GND	Private	34	35	71
341	No ID	UNK	I	Good	DEC	State	21	35	71

Table 3-13. Raptor Nest Status within and adjacent to the SFD Project Area (Cont.)

342	No ID	FH	I	Poor	GND	Private	3	35	71
343	No ID	UNK	I	Good	DEC	Private	13	35	71
344	No ID	FH	I	Fair	GND	Private	24	35	71
345	No ID	UNK	I	Fair	DEC	Private	26	35	71
346	No ID	SH	A	Fair	DEC	Private	26	35	71
352	No ID	UNK	I	Fair	DEC	Private	17	36	71
353	No ID	UNK	I	Good	DEC	Private	17	36	71
354	No ID	UNK	I	Fair	DEC	Private	29	36	71
355	No ID	UNK	I	Good	DEC	Private	14	35	71

¹ FH – Ferruginous Hawk; UNK-Unknown raptor species; SH-Swainson’s Hawk; GHO-Great Horned Owl; GE-Golden Eagle; RTH-Red-tailed Hawk;

² Active (A)- Eggs, chicks, or adult in incubating position in nest; Failed (F)- Active nest that failed to produce young to fledging age; Gone (G)- No nest material remains on substrate; Inactive (I)- No eggs or chicks; Productive - Young fledged from nest; Visited (V)- Bird observed at or near the nest

³ DEC - Deciduous Tree; GND – Ground; LOW - Low Ridge/Hillside; ROK - Rock Outcrop

Table 3-14. Endangered, Threatened, and Candidate Wildlife Species that May Occur within the SFD Project Area

Common Name	Scientific Name	Status
Mammals		
Preble’s Meadow Jumping Mouse	<i>Zapus hudsonius preblei</i>	Threatened
Birds		
Greater Sage-grouse	<i>Centrocercus urophasianus</i>	Candidate
Platte River Species of Critical Concern		
Least Tern	<i>Sterna antillarum</i>	Endangered
Piping Plover	<i>Charadrius melodus</i>	Endangered
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	Endangered
Whooping Crane	<i>Grus Americana</i>	Endangered

Source: USFWS (2012)

sage-grouse populations (USFWS 2012). The State of Wyoming has developed a “Core Population Area” strategy in an attempt to address the significant decline in greater sage-grouse populations in Wyoming. The Core Population Area concept focuses on maintenance and enhancement of grouse habitat, populations, and connectivity areas within the state. New development or land uses within Core Population Areas should be authorized or conducted only when it can be demonstrated that the activity will not cause declines in Greater Sage-Grouse populations. There are no greater sage-grouse core areas within 4 miles of the SFD project area.

Throughout much of the year, adult sage-grouse rely on sagebrush to provide roosting cover and food and cannot persist in areas without sagebrush (Connelly et al. 2004). Sage-grouse also exhibit site fidelity to lekking and nesting areas, as well as to summer and winter ranges (Eng 1963; Dunn and Braun 1985; BLM 2006). According to WYNDD’s sensitive species database, there have been 49 observations of sage-grouse within 6 miles of the SFD project area and six observations inside the SFD

project area. During ground surveys in May 2012, HWA observed one greater sage-grouse within 1 mile of the SFD project area. There are no known leks that occur within 2 miles of the project area. The nearest sage-grouse leks include the South Poison Draw lek (3.75 miles north) and the UL Oil Field lek (5.6 miles east). The South Poison Draw lek was discovered in 1984, was not surveyed from 1985 to 2010, and was surveyed once from the air in 2011 when no birds were observed. Its 2012 WGFD classification is “Undetermined”. The UL Oil Field lek was discovered in 1982, last documented as active in 2003, and classified by WGFD as “Unoccupied-Destroyed” in 2012. Therefore, this species does have the potential to occur within and around the SFD project area.

Platte River Species

The least tern, piping plover, pallid sturgeon, and whooping crane are listed in Wyoming as Platte River Species of Critical Concern. Platte River species of concern could be impacted in the downstream reaches of this river system if the Proposed Action leads to consumptive use of water or have the potential to affect water quality in the Platte River system. There are no Platte River tributaries within the project area. There is a remote possibility that water required for drilling and completion activities could be obtained from sources within the Platte River watershed. If water is obtained from a hydrologically connected basin of the Platte River watershed and exceeds 0.1 acre/feet per year, then formal consultation with the USFWS will be required during the processing of the individual APD’s.

3.8.5 BLM Sensitive Wildlife

There are 23 BLM sensitive wildlife species that may occur in lands managed by the Casper Field Office, summarized in Table 3-15. In general, each species has a very specific set of habitat requirements, and suitable habitat is present for 13 of the 23 species on or adjacent to the SFD project area. However, not all of these 13 species are currently known to occur within the SFD project area.

The *swift fox* is adapted to living in prairie regions (Egoscue 1979) and is native to grassland prairies in the Great Plains (Kahn et al. 1997). In Wyoming, the swift fox prefers relatively high densities of shrubs such as sagebrush and greasewood, as compared to the typical prairie habitats found elsewhere (Wooley et al. 1995, Olson 1999; Dark-Smiley and Keinath 2003). There are no documented occurrences of swift fox within the SFD project area (WYNDD 2012; WGFD 2012).

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. 2004). No black-tailed prairie dogs have been documented within the project area (WYNDD 2012, WGFD 2012). During aerial and ground surveys conducted in the spring and summer of 2012 by HWA, no black-tailed prairie dog colonies were located on or near the SFD project area.

Table 3-15. BLM Sensitive Wildlife Species that May Occur within Lands of the Casper Field Office

Species	Scientific Name	Habitat Description¹	Likely To Occur
MAMMALS (7)			
Bat, Townsend's Big-eared	<i>Corynorhinus townsendii</i>	Deciduous forests, dry coniferous forests, basin-prairies, mountain foothills shrublands, desert grasslands, juniper	No
Bat, Spotted	<i>Euderma maculatum</i>	Associated with a variety of habitat types over their range, but known only from juniper shrublands and desert sagebrush-grasslands in Wyoming.	No
Myotis, Long-eared	<i>Myotis evotis</i>	Coniferous forests, especially ponderosa pine and juniper; cottonwood-riparian; basin-prairie shrublands; sagebrush-grasslands	No
Myotis, Fringed	<i>Myotis thysanodes</i>	Conifer forests, woodland-chaparral, caves and mine, basin-prairie shrublands	No
Fox, Swift	<i>Vulpes velox</i>	Eastern great plains grasslands, occasionally agricultural areas, irrigated native meadows, roadside/railroad banks.	Yes
Prairie Dog, White-tailed	<i>Cynomys leucurus</i>	Basin-prairie and mountain-foothills shrublands, sagebrush-grasslands, shortgrass and midgrass grasslands.	No
Prairie Dog, Black-tailed	<i>Cynomys ludovicianus</i>	Short-grass and midgrass prairie/grasslands	Yes
BIRDS (15)			
Goshawk, Northern	<i>Accipiter gentilis</i>	Coniferous forests, especially Douglas fir and lodgepole pine, aspen. Forages in a variety of habitats.	No
Sparrow, Baird's	<i>Ammodramus bairdii</i>	Grasslands, weedy fields; shortgrass eastern great plains grasslands.	Yes
Sparrow, Sage	<i>Amphispiza belli</i>	Basin-prairie shrub, mountain-foothill shrub	Yes
Owl, Burrowing	<i>Athene cunicularia</i>	Grasslands, basin-prairie shrublands, agricultural areas.	Yes
Hawk, Ferruginous	<i>Buteo regalis</i>	Basin-prairie shrublands; eastern great plains, great basin-foothills, and mountain-foothills grasslands; rock outcrops; cottonwood-riparian	Yes
Plover, Mountain	<i>Charadrius montanus</i>	Shortgrass and mixed grass prairies, great basin-foothills grasslands, sagebrush-grasslands	Yes

Table 3-15. BLM Sensitive wildlife species that may occur within lands of the Casper Field Office (cont.)

Cuckoo, Yellow-billed	<i>Coccyzus americanus</i>	Open woodlands, streamside willow and alder groves; Cottonwood-riparian below 7,000 feet, urban areas	No
Swan, Trumpeter	<i>Cygnus buccinator</i>	Lakes, ponds, rivers, marshes	No
Falcon, Peregrine	<i>Falco peregrinus</i>	Tall cliffs in most habitats	No
Eagle, Bald	<i>Haliaeetus leucocephalus</i>	Lodgepole pine, Douglas fir, Englemann spruce-subalpine fir, other or mixed coniferous forests, cottonwood-riparian near large lakes and rivers. Forages in open habitats during the winter.	Yes
Shrike, Loggerhead	<i>Lanius ludovicianus</i>	Pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands.	Yes
Curlew, Long-billed	<i>Numenius americanus</i>	Sagebrush-grasslands; eastern great plains, great basin-foothills, mountain foothills, and wet-moist meadow grasslands; irrigated native meadows; with aquatic areas nearby. Also other agricultural areas and shorelines.	Yes
Thrasher, Sage	<i>Oreoscoptes montanus</i>	Basin-prairie shrub, mountain-foothill shrub	Yes
Ibis, White-faced	<i>Plegadis chihi</i>	Marshes, wet-moist meadows, lakes, irrigated meadows	No
Sparrow, Brewer's	<i>Spizella breweri</i>	Basin-prairie and mountain-foothills shrublands, especially sagebrush, woodland-chaparral	Yes
AMPHIBIANS (1)			
Frog, Northern Leopard	<i>Rana pipiens</i>	Swampy cattail marshes, beaver ponds, streams, rivers, and lakes in the plains, foothills, and montane zones up to 9,000 feet	Yes

¹Descriptions are adapted from the following sources: Atlas of Birds, Mammals, Amphibians, and Reptiles in Wyoming (Orabona et al. 2009); Wyoming Natural Diversity Database (WYNDD 2012).

The *Baird's sparrow* has been documented in Converse County, Wyoming, albeit rarely, and probably during migration (Luce et al. 1999, Luce and Keinath 2003). This small passerine sparrow can be found in overgrown fields and grasslands with a preference for taller, dense grasses and a preference for oak species that grow on north-facing slopes (The Nature Conservancy 1997). One documented observation of this species occurred approximately 4 miles northeast of the SFD project area in 2000 (WYNDD 2012).

The *sage sparrow* prefers large, contiguous areas of tall, dense big sagebrush and is considered to be a sagebrush obligate (Hansley and Beauvais 2004a). Although there

have been no documented occurrences of the sage sparrow within the SFD project area, the bird has been observed in the surrounding area. Thus this species likely occurs within the SFD project area and may breed within the project area.

Burrowing owls breed across much of Wyoming where they are a summer resident, usually arriving on breeding grounds from late March to mid-April (Johnsgard 1986, Haug et al. 1993, BLM 2006). 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). There have been no observations of burrowing owls within the SFD project area. Additionally, during aerial and ground surveys conducted in the spring and summer of 2012 by HWA, no black-tailed prairie dog colonies were located in or near the SFD project area.

The *ferruginous hawk* occurs in open environments such as grasslands and the shrubsteppe habitats of the inter-mountain west and typically avoids areas of closed canopy forests, extremely high elevations, intensive agriculture, and urban development (Travsky and Beauvais 2005b). Ferruginous hawks breeding in Wyoming are generally thought to migrate south in the winter. Ferruginous hawks nest on trees, buttes, cliffs, and rock outcrops where trees typically only occur in small patchy stands (Smith and Murphy 1973, Travsky and Beauvais 2005b). During ground surveys in May 2012, HWA located one active and 13 inactive ferruginous hawk nests within 0.5 mile of the SFD project area (Table 3-13). Thus this species is found and breeds in the SFD project area.

Bald eagles are almost always associated with open water habitats such as lakes, rivers, ocean coasts, and marshes or wetlands, where they feed primarily on fish (Travsky and Beauvais 2005c, BLM 2006). In Wyoming, mature cottonwood stands along water ways as well as riverside conifers are considered typical nesting habitat (BLM 2006, Travsky and Beauvais 2005c). No observations of bald eagles exhibiting breeding activity have been documented in the SFD project area, and because very few perennial bodies of water or nesting trees occur within the SFD project area, nesting is unlikely. The bald eagle was removed from the federal list of threatened and endangered species.

The *loggerhead shrike* is a small predatory songbird that hunts from perches and is known for impaling its prey on thorns, barbed wire fences and cactus spines (Yosef 1996; BLM 2006). Its habitat includes open country with adequate access to dense trees and shrubs (Keinath and Schneider 2005). It requires a mix of dense trees or shrubs for nesting (typically taller than 6 ft) and access to open areas with low or bare ground cover for foraging. Loggerhead shrikes have been documented in the SFD project area, with one sighting occurring inside the SFD project area boundary (WYNDD 2012).

The *long-billed curlew* is found in open prairies and prefers firm moist mud substrate (e.g., high tidal areas) to soft moist mud or sand (e.g., low tidal areas) during the non-breeding season. It nests in prairies and grassy, wet meadows typically near a water

source (Redmond 1989), such as lakes or sloughs (Dinsmore 1983). Long-billed curlews have been documented in the area but no observations have occurred within the SFD project area (WYNDD 2012).

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 (Smith and Keinath 2004). There are no documented occurrences of mountain plovers within or near the SFD project area (WYNDD 2012; WGFD 2012).

The *sage thrasher* is a sagebrush obligate that generally occurs within shrub-dominated valleys and plains across the western U.S. (Buseck et al. 2005). Like the greater sage-grouse, sage thrashers typically breed in sagebrush steppe habitats dominated by big sagebrush. Although observations of sage thrashers have been documented in the area, none occur within the SFD project area. This species may be present in and around the SFD project area.

The *Brewer's sparrow* is a sagebrush obligate species and is generally considered to be abundant and widespread throughout Wyoming. They typically nest in sage shrublands dominated by big sagebrush with an average canopy height less than 5 feet (Rotenberry et al. 1999, Hansley and Beauvais 2004b) and minimal amounts of herbaceous cover underneath (Knopf et al. 1990). WYNDD's species accounts document sightings of Brewer's sparrows outside of the SFD project area, thus it is likely that the Brewer's sparrow may breed within the SFD project area, given suitable habitat.

The *northern leopard frog* usually inhabits areas in or near permanent water with aquatic vegetation and is found in a wide variety of environments from deserts, plains, and woodlands to mountain meadows up to 9,000 feet (BLM 2006; WYNDD 2012). More broadly, this species is found throughout North America, except on the west coast. No observations of the northern leopard frog have been documented by WYNDD, or WGFD, WOS within or around the SFD project area. This species could occur within the SFD project area, although occurrence is unlikely.

3.9 Transportation

Primary access to the SFD project area is afforded by Converse County Road #32, commonly referred to as the Highland Loop Road (Figure 1-1). Access to the Highland Loop Road from Glenrock is via State Highway (SH) 95 then north on SH 93. From Douglas access is via SH 59. Local resource roads connect the Highland Loop Road with the existing oil wells in the SFD project area. Other county roads in the vicinity of the SFD project area include County Road #31 (Ross Road) and County Road #32 (Jenne Trail Road).

Due to increasing energy development activity in the southeastern portion of the State, (Converse, Platte, Goshen and Laramie Counties), the Wyoming State Legislature funded a rural road impact study in this area (WYDOT - In Preparation). Part of the study included traffic counts in the vicinity of the project area. A station located on the Ross Road 2 miles north of SH 93 recorded an average of 967 vehicles per day during the period from June 25 to June 28, 2012 (CCRB 2012). The highest traffic flow was in the morning between 5:00 a.m. and 6:00 a.m., with an average of 123 vehicles per hour, of which 72 percent were cars and 28 percent were trucks. A second count with a shorter time period was conducted on the Ross Road, 2 miles north of the Jenne Trail Road. This count was conducted on June 25, 2012 and resulted in a daily average 384 vehicles, comprised of 210 cars (54 percent) and 174 trucks (46 percent). No traffic counts were conducted on the Highland Loop Road.

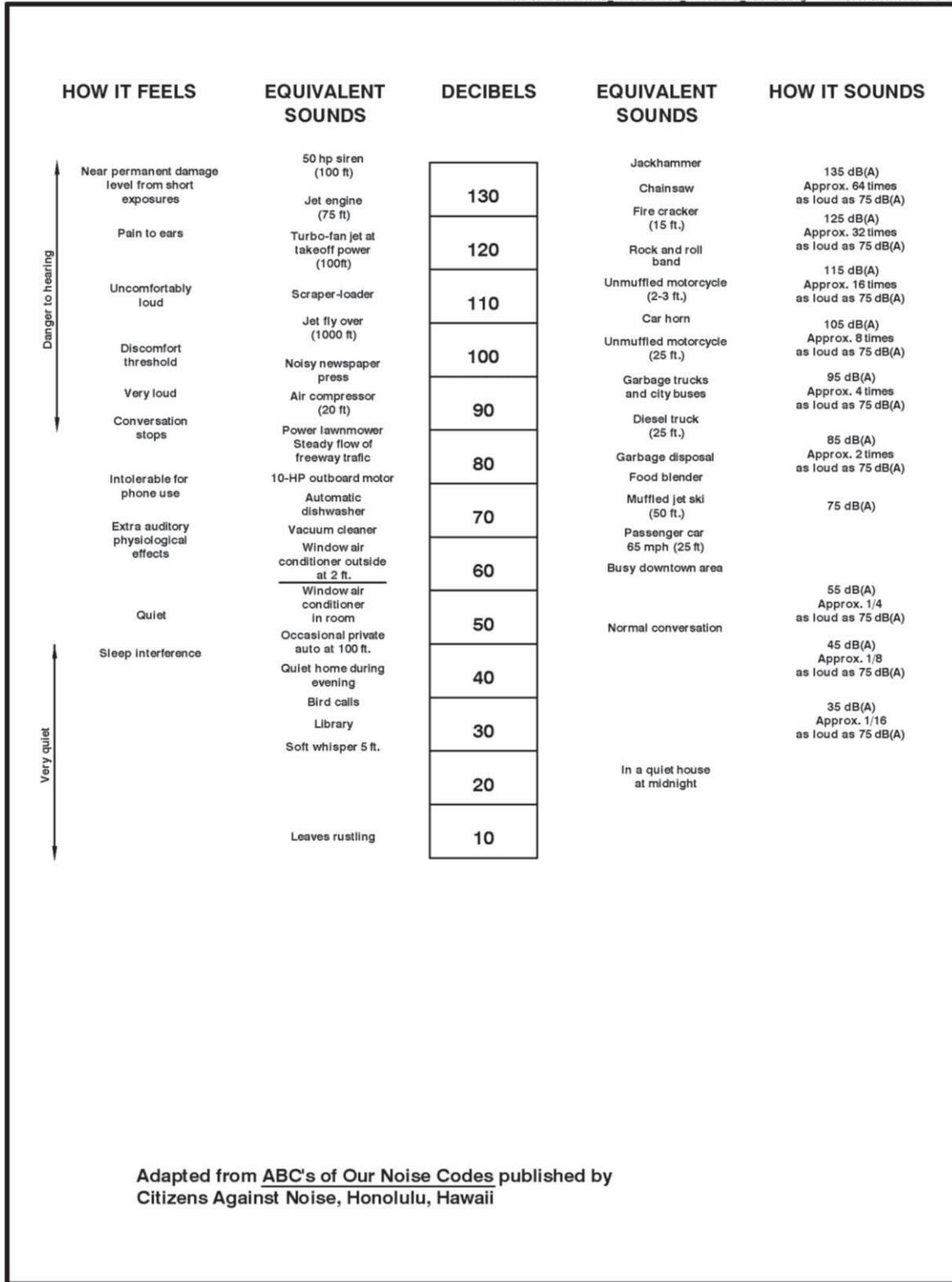
Due to the minimal amount of public lands surface estate within the SFD project area, public travel is low. Roads within the SFD project area see limited use, consisting primarily of local energy-related and ranching traffic. BLM and county roads have historically been built to the appropriate standards for the anticipated use, as have the private roads in the area. Single-lane roads provide access to individual well sites and are used primarily by site workers but may be used by ranchers. Access to the SFD project area for contractors, drilling crews, production personnel, and the general public is from county roads, which in turn are accessed by two state highways.

3.10 Noise

Current background noise in the SFD project area comes primarily from the traffic and pumping equipment associated with the existing oilfield activity. Additional noise is caused by wind. The nearest noise receptors are the residences located within or adjacent to the SFD project area.

For purposes of noise impacts evaluations, sound pressure levels (measured in decibels) are represented using the dBA (A-weighted decibel) scale. This measure is designed to simulate human hearing by placing less emphasis on lower frequency noise because the human ear does not perceive sounds at low frequency in the same manner as sounds at higher frequencies. Figure 3-4 presents noise levels associated with some commonly heard sounds.

WWC Engineering conducted a baseline noise survey within the SFD project area on August 15, 16, and 17, 2012. Baseline noise measurements were collected at a local residence and along the Highland Loop Road using a Quest SoundPro DL-2 sound level meter, which measures noise between 0 and 140 dBA. Overnight readings were collected at the residence located in the SW $\frac{1}{4}$ of Section 31, T36N, R71W and a reading of one hour duration was collected along the Highland Loop Road. Results of the sound surveys are presented in Table 3-16. The highest readings of 82 dBA were associated with truck traffic on the Highland Loop Road and are consistent with the published data listed in Table 3-16. Baseline readings are dependent upon



Adapted from ABC's of Our Noise Codes published by Citizens Against Noise, Honolulu, Hawaii

Figure 3-4. Relationship Between A-Scale Decibel Readings and Sounds of Daily Life

Table 3-16. Baseline Sound Readings Associated with the SFD Project Area

Source/Site	dBA at 40'
Highland Loop/Boner Private Junction ¹	48.3 (min) 82.6 (max)
Highland Loop Service Road ¹	48.5 (min) 54.0 (max)
Local Residence ¹	39.8 (min) 48.9 (max)

¹ Short duration measurement

² Long-term duration: 926 readings between 10:27 - 08/15/12 and 3:39 - 08/17/12

atmospheric conditions, which can cause variations in sound patterns and wind resulting in increases in decibel values.

Baseline noise measurements were collected at three existing well pads, with various configurations of pumping equipment operating, using a Quest SoundPro DL-2 sound level meter. One well pad had three pumping jacks powered by Ajax® gas engines. The Ajax® engines were equipped with Vanec® industrial silencers, which are considered BACT. A single unmuffled Ajax engine and a pump jack powered by an electric motor were also measured. Sound measurements were taken at the property boundary of a local residence. Results of the sound surveys are presented in Table 3-17.

Table 3-17. Sound Readings Associated with Pumping Equipment Configurations

Source/Site/Well Name	Average dBA at 40'	Average dBA at 1,280'
Three-well Pad (with Vanec® muffled Ajax® engines)(DCR State 21-16H)	64.7	30.3
One-well Pad (with unmuffled Ajax engine)(Hornbuckle Fee 11-33 -38-73H)	64.7	41.3
One-well Pad (with electric motor)(State 31-15 37-73H)	58.2	32

Discussions of transportation and traffic are included in Section 3.9. Table 3-18 presents typical noise levels from vehicles at a distance of 45 feet and speeds ranging from 50 to 75 mph (DOT 1995).

3.11 Visual Resources

Visual sensitivity levels are determined by people's response to what they see and the frequency of travel through an area. The SFD project area is primarily an area of rolling plains (short-grass prairie) that is predominantly used for livestock grazing. Man-made intrusions on the natural landscape in the area include oil and gas development (oil well pad facilities, pipeline and utility ROWs, and access roads), transportation facilities (public and private roads, road signage, power and utility transmission lines), ranching activities (fences, ranch buildings, and livestock), and environmental monitoring installations. The current natural scenic quality in and

Table 3-18. Typical Vehicle Noise Levels

Speed (mph)	Noise Level at 45 ft (dBA)		
	Automobiles	Medium Trucks	Heavy Trucks
45*	61	73	79
50	62	74	80
55	64	76	81
60	65	77	82
65	67	78	83
70	68	79	84

Notes: Automobiles: All vehicles with two axles and four wheels
Medium Trucks: All vehicles with two axles and six wheels
Heavy Trucks: All vehicles with three or more axles
*Noise levels for 45 mph were extrapolated to include current speed limits
Source: DOT (1995)

near the SFD project area is fairly low because of the industrial nature of the oil and gas field development.

The Visual Resource Management (VRM) system is the basic tool used by BLM to inventory and manage visual resources on public lands. The SFD project area is within a Class IV visual resource management area where the level of change to the characteristic landscape can be high. In a Class IV management area landscape, modifications may dominate the view and be the major focus of the viewer change to the characteristic landscape can be high. In a Class IV management area landscape, modifications may dominate the view and be the major focus of the viewer attention. However, in a Class IV management area landscape, every attempt would be made to minimize the impacts of these activities through careful location, minimal disturbance, and repeating basic elements.

3.12 Waste and Hazardous Materials Management

The management of non-exempt hazardous and non-hazardous (solid) wastes is regulated under the Resource Conservation and Recovery Act (RCRA) (40 CFR Part 260-268), while the management of releases of hazardous materials into the environment is regulated under the Comprehensive Environmental Response, Compensation and Liabilities Act (CERCLA) (40 CFR Part 300-374). Oil and gas exploration, production, gas-gathering, processing wastes, and releases of hazardous materials into the environment are generally considered to be RCRA-exempt and are regulated by the WOGCC or WDEQ and the BLM.

Transportation of hazardous materials to the well locations is regulated by the Department of Transportation (DOT) under 49 CFR, Parts 171–180. Potentially hazardous substances used in the development or operation of wells will be kept in limited quantities on well sites and at the production facilities for short periods of time.

The concentration of nonexempt hazardous substances in the reserve pit at the time of pit backfilling must not exceed the standards set forth in CERCLA as amended by the

Superfund Amendments and Reauthorization Act (SARA). All oil and gas drilling-related CERCLA hazardous substances removed from a location and not reused at another drilling location would be disposed of in accordance with applicable federal and state regulations. Only those hazardous wastes that qualify as exempt under RCRA will be disposed of in the reserve pit.

3.13 Public Health and Safety

SRC has a safety plan in place that addresses workplace safety and emergency responses. All SRC personnel and contractors that are on site receive training in the plan as well as task-specific safety training. Public health and safety is addressed in SRC's Spill Prevention Control and Countermeasures (SPCC) plan and above ground storage tanks (ASTs) plan, as mandated by federal and state regulations through the EPA and the WDEQ. The EPA administers and enforces the SPCC regulations and WDEQ administers the regulations for ASTs.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

In accordance with 40 CFR §1502.16, this chapter includes a discussion of the potential environmental consequences (impacts) of construction, drilling, completion, production, and maintenance activities associated with the Proposed Action and the No Action Alternative. An environmental impact is defined as a change in the quality or quantity of a given resource due to a modification in the existing environment resulting from project-related activities. Impacts can be beneficial or adverse; a primary (direct) result or a secondary (indirect) result of an action; long term (more than 5 years) or short term (less than 5 years) in duration; and can vary in degree from a slightly discernible change to a total change in the environment.

Potential impacts are quantified when possible; however, when impacts are not quantifiable, appropriate adjectives are used to best describe the level of impact, and appropriate mitigation measures are suggested, where appropriate.

The Proposed Action for the Scott Field EA would add 150 additional wells on 40 new well pads, resulting in additional short- and long-term disturbance. BLM LR2000 records indicate that 15 federal oil and gas leases within the project area have not achieved held by production status (BLM 2013). For comparison purposes, it was assumed that a minimum of 15 new wells would be drilled on 15 single-well pads under the No Action Alternative. Therefore, the Proposed Action and the No Action Alternative would both result in impacts, which are discussed below. The disturbance related to the Proposed Action and the No Action Alternative includes pads, roads, and pipelines (Table 2-1).

4.2. Air Resources

4.2.1 Proposed Action

4.2.1.1 Air Quality

Construction and operations air quality emissions associated with the Proposed Action would include PM₁₀, SO₂, NO₂, CO; and O₃, which is created by chemical reactions between NO_x and volatile organic compounds (VOCs) in the presence of sunlight. These emissions would result primarily from construction, drilling and completion activities; from handling of produced oil (product flashing and tank truck loading); and from emissions from natural gas engines used to operate well pumping equipment.

While no air quality analyses have been conducted in this specific area, there are several environmental analyses for projects proposed in or related to Converse County, Wyoming, for which air quality impact analyses were done. These projects, nearby and of similar scale, are the *Environment Assessment of Samson Resources Company's Proposed Field Development Program in and adjacent to the Hornbuckle Field, Converse County, Wyoming* (BLM 2011), *Environmental Assessment for Samson Resources Company Hornbuckle Field Development Program EA Update* (BLM 2012f), the *Environmental Assessment for Highland Loop Road Exploratory Oil and Gas Development Project* (BLM 2012b), and the *Proposed Douglas Quarry Mineral Materials Expansion Project, Converse County, Wyoming* (BLM 2012c). These analyses concluded that no substantial impacts would occur to the airshed as a result of the activities proposed in conjunction with these respective environmental assessments.

As of 2010, there were approximately 39,500 producing oil and gas wells in the High Plains District jurisdictional area (BLM 2012b). Converse County, which includes the SFD project area, is currently considered to be in attainment for the NAAQS and the WAAQS (EPA 2012 and WDEQ/AQD 2010). The Proposed Action would add a maximum of 150 wells to this area, which represents an increase in the number of producing wells in the High Plains jurisdictional area of approximately 0.4 percent. Potential air quality impacts from the Proposed Action would result from the additional oil field related traffic on access and county roads that would create extra particulate matter (PM₁₀ and PM_{2.5}). The added wells and associated natural gas-powered production equipment would also generate additional air quality related emissions (primarily NO_x, CO, VOLs, SO₂, and O₃), but these potential impacts are not significantly different than air quality impacts from current oil and gas production. The Proposed Action would have direct, short- and long-term adverse impacts on air quality but, based on the relatively slight increase in the number of wells and assuming the mitigation measures described in Section 4.2.1.3 are implemented, the Proposed Action would not result in violations of air quality standards.

4.2.1.2 Greenhouse Gas Emissions

The Proposed Action would add 150 additional wells on 40 new well pads. Initially, commercial electric power may not be available in SFD project area and SRC would use natural gas fueled engines to power the pumping units on new wells. The gas engines would be powered by natural gas produced by the wells. SRC anticipates the use of 115 horsepower (hp) Ajax® gas engines, using the BACT for stack emissions. These gas pump engines would be permitted and approved by WDEQ/AQD under standard air permitting practices.

The Center for Climate Strategies (CCS) prepared the Wyoming Greenhouse Gas Inventory and Reference Case Projection 1990-2020 (Inventory) for the WDEQ through an effort of the Western Regional Air Partnership (CCS 2007). This report presented a preliminary draft GHG emissions inventory and forecast from 1990 to 2020 for Wyoming.

The 2007 report estimated that the 2010 total gross CO₂e emissions for Wyoming would be 60.3 million metric tons (MMt), with the oil and gas industry contributing approximately 12.1 MMt of CO₂e emissions, which accounts for 20 percent of the CO₂e emissions for Wyoming (CCS 2007). The annual oil and gas associated GHG emissions are expected increase slightly to 12.5 MMt by 2020 (CCS 2007).

As of 2010, there were approximately 59,500 producing oil and gas wells in the state (BLM 2012b). Based on the above information, the 2010 per well CO₂e emissions from oil and gas wells within Wyoming amounted to approximately 0.0002 MMt annually (12.1 MMt ÷ 59,500 = 0.0002 MMt), assuming steady production and emissions venting. The 2010 estimated CO₂e emissions for the 39,500 producing wells in the High Plains District, which includes the project area, were 7.9 MMt.

Based on this emissions factor, if the Proposed Action were selected and if all 150 oil wells were in production, the Proposed Action could result in additional GHG emissions of approximately 0.03 MMt of CO₂e annually. This represents a 0.04 percent increase over the estimated 2010 annual CO₂e emissions for the High Plains District. Over the 45- to 50-year life of the project, between 1.4 and 1.5 MMt of CO₂e emissions are expected to be generated.

4.2.1.3 Mitigation and Monitoring

Best management practices (BMPs) such as those used to reduce fugitive dust emissions, air quality, and greenhouse gas emissions would help mitigate effects to these resources. Further analysis at the APD and facility application stages of development may examine possible mitigations to alleviate site-specific impacts.

The BLM holds regulatory jurisdiction over portions of natural gas and petroleum systems identified in the EPA's Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006 document. Exercise of this regulatory jurisdiction has led to development of BMPs designed to reduce emissions from field production and operations. Analysis

and approval of future development on the lease parcels would include applicable and reasonable BMPs as COAs in order to reduce or mitigate GHG emissions. Additional measures developed at the project development stage could be incorporated as COAs in the approved APD.

Such mitigation measures may include, but are not limited to:

- Flaring hydrocarbon and gases at high temperatures in order to reduce emissions of incomplete combustion through the use of multi-chamber combustors;
- “Green” (flareless) completions;
- Watering dirt roads during periods of high use to reduce fugitive dust emissions;
- Requiring that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored;
- Installing of liquids gathering facilities or central production facilities to reduce the total number of sources and minimize truck traffic;
- Use of natural gas fired or electric drill rig engines;
- Use of selective catalytic reducers on diesel-fired drilling engines; and,
- Re-vegetate areas of the pad not required for production facilities to reduce the amount of dust.

4.2.2 *The No Action Alternative*

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development and air quality related impacts associated with the existing mineral development in the area would continue.

Based on the per well emission factor discussed in Section 4.2.1.2, the 15 oil wells that could be drilled on leases not held by production within the SFD project area (the No Action Alternative) would result in additional annual GHG emissions of approximately 0.003 MMt of CO₂e. Air quality related impacts similar to those described above would occur, but on a lesser scale.

4.3 Heritage Resources

4.3.1 *Proposed Action*

4.3.1.1 *Cultural Resources*

Impacts to fragile cultural resources normally result from surface disturbing actions and those that introduce incompatible elements to the cultural landscape such as

visual or audible. Essentially, any activity that creates or has the potential to create surface disturbance, regardless of the resource program to which it may be associated, can cause potential impacts to cultural resources. The management of cultural resources is subject to a variety of laws and regulations and the BLM is mandated to comply with these. In particular, Section 106 of the NHPA of 1966, as amended, requires the BLM to take into account the effect of any undertaking on significant cultural resources. Compliance is achieved through a national programmatic agreement and a subsequent State Protocol Agreement between the Wyoming BLM and the Wyoming SHPO (BLM/Wyoming SHPO 2006). Together, these agreements outline how BLM will meet its responsibilities under the NHPA. All BLM undertakings will follow these agreements and in particular, the Wyoming Protocol Agreement. The agreements outline the processes for project planning, identification of resources, determination of eligibility, determination of effect, resolution of adverse effects, and unanticipated discovery situations.

4.3.1.2 Native American Religious Concerns

The American Indian Religious Freedom Act (AIRFA) requires Native American tribal consultation on site types previously identified as highly sensitive. In the project area these site types would include prehistoric rock alignments, stone structures, rock cairns, rock piles, stone circles, rock art, and potential funerary sites. These site types have all been recorded within the Powder River Basin and there is a potential to encounter these site types within the SFD project area. On lands subject to federal jurisdiction, these sites are specially managed by the BLM via the use of buffer zones and avoidance. Any unanticipated discoveries of these sensitive site types made during activities within the SFD project area would be evaluated according to standard procedures. As a consequence, impacts to these site types would be negligible.

4.3.1.3 Paleontology

There is an overall moderate potential for the study area to contain fossil materials, and fossil localities are not common within the study area. Construction activities associated with mineral exploration have the potential to uncover and disturb fossil materials. Negative impacts to fossil localities are most likely to occur where construction activities will disturb bedrock outcrop areas.

4.3.1.4 Mitigation and Monitoring

Cultural Resources

In general, there are three BMPs which guide all undertakings. Simply stated these are, in order of preference: avoid, minimize, and mitigate. Significant sites will be avoided if possible. If sites cannot be avoided, the undertaking will minimize its physical surface imprint and a variety of design and coloring techniques will be implemented to minimize its impact to a no effect or no adverse effect determination. If the previous steps do not achieve a no effect or no adverse effect finding then a

mitigation plan will be developed in conjunction with BLM, SHPO, the Advisory Council on Historic Preservation (ACHP), and interested parties. All BLM permitted activities in the study area will contain the following standard cultural stipulation:

“The permittee is responsible for informing all persons in the area who are associated with this project that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. If historic or archaeological materials are uncovered during construction, the operator is to immediately stop work that might further disturb such materials, and contact the Authorized Officer of the BLM Casper Field Office. Within five working days the Authorized Officer will inform the operator as to: (1) whether the materials appear eligible for the National Register of Historic Places; (2) the mitigation measures the operator will likely have to undertake before the site can be used (assuming in situ preservation is not necessary); and, (3) a timeframe for the Authorized Officer to complete an expedited review under 36 CFR 800.11 to confirm, through the State Historic Preservation Officer, that the findings of the Authorized Officer are correct and that mitigation is appropriate. The Authorized Officer will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the Authorized Officer that the required mitigation has been completed, the operator will then be allowed to resume construction measures.”

Native American Religious Concerns

Should unidentified sensitive sites of Native American concern (as defined by Executive Order 13007) be located in conjunction with project related activities, the appropriate tribes would be consulted and recommendations solicited regarding measures necessary to eliminate potential effects of the Project Action.

Implementation of the following measures should ensure that there would be no impact to Native American sacred sites:

- a) Native American sites including but not limited to cairns and stone circles would be avoided by a minimum of 300 feet or visual horizon, whichever is less, unless closer activities are approved through consultation with the affected tribes and written permission is given by the authorized officer.
- b) Native American rock art sites would be avoided by a minimum of 0.5 mile or visual horizon, whichever is less, unless closer activities are approved through consultation with the affected tribes and written permission is given by the authorized officer.
- c) Native American funerary sites would be avoided by a minimum of 1 mile or evaluated on a case-by-case basis for site-specific avoidance and mitigation measures. All pertinent provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) and the NHPA would be applied to sites in federal jurisdiction.
- d) If SRC personnel identify any sites of potential Native American religious concern not found during the Class III inventory, regardless of surface ownership, the

BLM CFO archeologist would be notified promptly. The BLM CFO would determine the need for special mitigation measures and/or additional Native American consultation per regulations under the NHPA or NAGPRA as needed.

Paleontology

“The permittee shall immediately notify the BLM Authorized Officer of any paleontological resources discovered as a result of operations under this authorization. The permittee shall suspend all activities in the vicinity of such discovery until notified to proceed by the Authorized Officer and shall protect the discovery from damage or looting. The permittee may not be required to suspend all operations if activities can be adjusted to avoid further impacts to a discovered locality or be continued elsewhere. The Authorized Officer will evaluate, or will have evaluated, such discoveries as soon as possible, but not later than 10 working days after being notified. Appropriate measures to mitigate adverse effects to significant paleontological resources will be determined by the Authorized Officer after consulting with the operator. Within 10 days, the operator will be allowed to continue construction through the site, or will be given the choice of either (1) following the Authorized Officer’s instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource, or (2) following the Authorized Officer’s instructions for mitigating impacts to the fossil resource prior to continuing construction through the project area.”

4.3.2 The No Action Alternative

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development and impacts to heritage resources associated with the existing mineral development in the area would continue.

Using the average per pad disturbance included in Table 2-1, the estimated maximum disturbance (including pads, roads, and pipelines) associated with the 15 oil wells that could be drilled on leases not held by production within the SFD project area under the No Action Alternative would be approximately 258 acres. Cultural resources, sites of Native American concern, and paleontological resources may be present in the disturbance areas but impacts would be less than the Proposed Action.

4.4 Vegetation

4.4.1 Primary Cover Types

4.4.1.1 Proposed Action

Impacts to vegetation include removal of vegetative communities, decreased forage production, and the possible introduction of invasive, non-native plant species.

Initial impacts consist of temporary removal of vegetation as a result of construction activities from well pads, ancillary facilities, roads, and pipelines. Long-term impacts include long-term loss of vegetation associated with operation and maintenance activities of well pads and roads.

Indirect impacts may include vegetation loss from oil spills, dust emissions, and the introduction of noxious weeds and non-native plant species. The dust deposited on the plants may reduce plant vigor, productivity, and health. As a result of the introduction of noxious weeds, plant diversity and communities may change.

Under the Proposed Action (see Table 2-1), 686 acres of SFD project area would be disturbed in the short term (1.5 percent). Approximately 65 percent of this disturbance (444 acres) would undergo interim reclamation utilizing native seed species. The final 242 acres will be successfully reclaimed after the 45- to 50-year expected project life.

4.4.1.2 The No Action Alternative

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development and impacts to vegetation associated with the existing mineral development in the area would continue.

The estimated maximum disturbance associated with the 15 oil wells that could be drilled under the No Action Alternative would be approximately 258 acres (0.6 percent of the project area). Interim reclamation would reduce the long-term disturbance associated with the No Action Alternative to approximately 91 acres. Impacts to vegetation similar to those described above would occur, but on a lesser scale.

4.4.1.3 Mitigation and Monitoring

Mitigation measures for primary cover types will be used for successful revegetation. The following mitigation measures are recommended to protect vegetative resources:

- Revegetate disturbed areas with approved, weed-free seed mixes. Site specific seed mixtures will be approved by the authorizing officer.
- Keep all disturbed areas as free of noxious weeds and undesirable species as practicable during construction, production, and reclamation operations.
- Require vehicles and equipment to arrive at the work site clean, power-washed, and free of soil and vegetative debris capable of transporting weed seeds or other propagules.

4.4.2 Threatened and Endangered Plant Species

4.4.2.1 Proposed Action

Of the four plants listed as threatened, endangered, or candidate species that could potentially occur in the SFD project area, only Ute ladies'-tresses has potential habitat within the project area (Table 4-1). No habitat exists for the Colorado butterfly plant, the blowout penstemon, or the western prairie fringed orchid (Platte River species) within the SFD Project area. As for the Ute ladies'-tresses, no plant populations were documented in 2012 and habitat is only marginally suitable. Development in riparian zones would be limited, since Appendix I of the Casper RMP recommends no surface disturbance within 500 feet of surface water and/or riparian areas unless an exception is granted in writing from the BLM (BLM 2007b). The ROD for the approved Casper RMP states that management will "Protect and (or) enhance riparian, wetland, and streamside areas, as necessary, with special management, including, but not limited to, fencing, development of alternative water supplies, livestock herding, placement of supplements (feed and mineral), pasture boundary adjustments, and season of use" (BLM 2012a). However, if development were to occur in riparian areas, there could be a loss of marginally suitable habitat for this species.

4.4.2.2 The No Action Alternative

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development and impacts to threatened, endangered, or candidate species associated with the existing mineral development in the area would continue.

The SFD project No Action Alternative would result in an estimated maximum disturbance of approximately 258 acres of vegetation. Interim reclamation would reduce the long-term disturbance associated with the No Action Alternative to approximately 91 acres. Impacts to threatened, endangered, or candidate plant species similar to those described above would occur, but on a lesser scale.

4.4.2.3 Mitigation and Monitoring

Although the potential habitat for Ute ladies'-tresses within the project area is unlikely to support the species, several mitigation measures are recommended to minimize or eliminate the loss/degradation of any riparian habitat:

- Development should be minimized in riparian corridors. Where possible well pads would be located at least 500 feet from Lightning Creek and Box Creek. Any roads or pipelines that cannot be re-routed would cross riparian zones in a manner that would minimize disturbance.

Table 4-1. BLM Threatened or Endangered Plant Species that May Occur within Lands of the Casper Field Office

Species	Scientific Name	Status ¹	Habitat	In Project Area	Effects ²	Justification
Blowout Penstemon	<i>Penstemon haydenii</i>	E	Sand blowouts or dunes	No	NE	Lack of suitable habitat in the project area.
Western Prairie Fringed Orchid (Platte River Species)	<i>Platanthera praeclara</i>	T	Downstream riverine habitat of the Platte River system	No	NE	Lack of suitable habitat in the project area.
Ute Ladies'-tresses	<i>Spiranthes diluvialis</i>	T	Seasonally moist soils and wet meadows of drainages below 7,000 ft. elevation	Possible	NLAA	Evidence of suitable habitat in project area. Documented populations occur in adjacent watersheds.
Colorado Butterfly Plant	<i>Gaura neomexicana coloradensis</i>	T	Wetland habitats along meandering stream channels on the high plains and subirrigated grasslands.	No	NE	Lack of suitable habitat in the project area.

¹ E = Endangered, T = Threatened

² NE = No Effect, NLAA = May effect, not likely to adversely affect

- Indirect disturbances to riparian areas such as accumulation of sediment or alteration of water flow should be minimized, in accordance with erosion control methods presented in Section 4.5.3.
- Additional Ute ladies'-tresses surveys will be conducted if any proposed development will occur in suitable habitat. If necessary, these surveys will be conducted from late July to late August.
- Keep all disturbed areas as free of noxious weeds and undesirable species as practicable during construction, production, and reclamation operations.

4.4.3 BLM Sensitive Plant Species

4.4.3.1 Proposed Action

There are six BLM sensitive species that may occur in Converse County; however, none are likely to occur in the SFD project area due either to a lack of suitable habitat, or in the case of the many-stemmed spider-flower, due to the fact that this species has

not been documented in the county. Therefore, it is expected the Proposed Action would not adversely impact BLM sensitive plant species.

4.4.4 Invasive, Non-Native Plant Species

4.4.4.1 Proposed Action

Invasive, non-native plant species can create a host of environmental and other effects, most of which are harmful to native ecosystem processes. Various referred to as exotic, invasive, non-native plant species, and noxious, these plants affect native communities by displacing native vegetation, disrupting habitats, and becoming established and spreading over time.

The construction of new well locations would initiate disturbance of soils and vegetation. In turn, machinery could gradually bring non-native species to the area along newly developed access roads.

Under the Proposed Action, 686 acres of SFD project area would be disturbed in the short term (1.5 percent). Approximately 65 percent of this disturbance (444 acres) would undergo interim reclamation utilizing native seed species. The final 242 acres will be successfully reclaimed after the 45- to 50-year expected project life. Invasive, non-native plant species would have a chance to establish after disturbance has occurred.

4.4.4.2 The No Action Alternative

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development and impacts related to invasive, non-native plant species associated with the existing mineral development in the area would continue.

The SFD project No Action Alternative would result in an estimated maximum disturbance of approximately 258 acres of soils and vegetation related to currently approved actions. Invasive, non-native plant species would have a chance to establish after disturbance has occurred. Interim reclamation would reduce the long-term disturbance associated with the No Action Alternative to approximately 91 acres. Impacts resulting from invasive, non-native plant species similar to those described above would occur, but on a lesser scale.

4.4.4.3 Mitigation and Monitoring

Mitigation measures to reduce impacts from invasive, non-native plant species will be utilized. The following mitigation measures are recommended:

- Keep all disturbed areas as free of noxious weeds and undesirable species as practicable during construction, production, and reclamation operations.

- Require vehicles and equipment to arrive at the work site clean, power-washed, and free of soil and vegetative debris capable of transporting weed seeds or other propagules.

4.5 Soils

Any disturbance of the soil resource associated with the No Action Alternative or Proposed Action will increase the potential for soil erosion and thus the potential for loss of the soil resource. The potential for soil loss is greatest on those areas within the SFD project area where physical disruption of the soil structure and soil crusting occurs, and the potential increases on steeper slopes. Proper care and handling of the soil resource is necessary to maximize suitable topsoil retention and reclamation success in disturbance areas.

4.5.1 *Proposed Action*

The primary potential impacts to the soil resources associated with the Proposed Action include removal of surface vegetation, disturbance of biological soil crusts naturally found in the soil in the SFD project area, loss of soil resources through erosion, potential mixing of suitable topsoil material and unsuitable subsurface soil horizons during suitable topsoil removal, degradation of soil structure, and soil contamination resulting from leaks or spills. All of these potential impacts could result in a reduction of topsoil quality and quantity and a reduction in the amount of topsoil available for reclamation.

Disturbance associated with the Proposed Action could lead to increased surface runoff and water erosion. The removal of vegetation and disturbance of the biological soil crusts results in soils that are more susceptible to water erosion. The highest rates of water erosion are expected during high intensity thunderstorm events that are common during the spring and summer months in the SFD project area. Water erosion during wet conditions could also increase due to wheel rutting from increased vehicle traffic and the resulting channeling of water flow.

Wind erosion is expected in association with the Proposed Action. The removal of vegetation and disturbance of the biological soil crusts results in soils that are more susceptible to wind erosion. In addition, some soil resource loss is expected during dry and windy conditions from vehicle travel on unimproved roads.

Although all of the soils in the SFD project area are mildly to moderately alkaline, elevated calcium carbonate levels and increased clay content in the unsuitable subsurface soil can have a negative effect on suitable topsoil quality. Care must be taken to minimize the amount of unsuitable soil stripped during the topsoil stripping process.

Degradation of soil structure occurs during the handling of suitable topsoil during the stripping process. When the soil structure is degraded, the suitable topsoil resource is more susceptible to wind and water erosion and decreased infiltration and organic

matter content. Excessive handling of the suitable topsoil resource can result in further degradation affecting the quality of suitable topsoil available for reclamation.

Soil compaction due to activities associated with the Proposed Action can also have a negative effect on soil quality. Soil compaction typically results from construction activities and heavy equipment usage. Soil compaction has a negative impact on soils and plant growth by destroying soil structure and decreasing infiltration rates and water holding capacity.

Soil contamination could occur from processes associated with the Proposed Action. Leaks and spills of petroleum products, drilling muds, pipeline ruptures, and other contaminants from production and storage facilities could occur and potentially affect soil quality at the location of the spill or be transported via surface runoff to nearby soil resources down gradient from the SFD project area.

The potential impacts to the soil resources associated with the Proposed Action (686 acres or 1.5 percent of the project area) are expected to be greatest during the initial construction phase. Impacts are expected to decrease over time and would not be substantial provided the mitigation and monitoring techniques described below are implemented.

4.5.2 *The No Action Alternative*

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development and impacts to the soils associated with the existing mineral development in the area would continue.

The SFD project No Action Alternative would result in an estimated maximum disturbance of approximately 258 acres of soils. Interim reclamation would reduce the long-term disturbance associated with the No Action Alternative to approximately 91 acres. Impacts to soil resources similar to those described above would occur, but on a lesser scale.

4.5.3 *Mitigation and Monitoring*

In order to minimize the overall impact to soil resources within the SFD project area, which could result from surface disturbing activities associated with the Proposed Action, SRC will implement the following mitigation measures:

- SRC will perform interim reclamation following completion of the last well on the pad or the expiration of the APD, whichever occurs first. Interim reclamation will occur on approximately 444 acres of the 686 acres disturbed.
- SRC will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-2012-032); for details see: <http://www.blm.gov/wy/st/en/programs/reclamation.html>.

- SRC will follow the guidance provided in the Wyoming Policy Management of Oil and Gas Exploration and Production Pits (IM WY-2012-007); for details see: <http://web.wy.blm.gov/Wy.im/12/wy2012-007.pdf>.
- SRC will follow the *Record of Decision and Approved Casper Resource Management Plan* (BLM 2007b).
- Individual site mitigation measures will vary by well location and circumstances and will be addressed during the application process within Surface Use Plan of Operations submitted by SRC.
- Except as otherwise provided in an approved Surface Use Plan of Operations, SRC will not conduct operations in areas subject to mass soil movement, riparian areas, floodplains, lakeshores, and/or wetlands. The SRC will also take measures to minimize or prevent erosion and sediment production. Such measures may include, but are not limited to:
 - a. Avoiding steep slopes and excessive land clearing when siting structures, facilities, and other improvements; and
 - b. Temporarily suspending operations when frozen ground, thawing, or other weather-related conditions would cause otherwise avoidable or excessive impacts.
 - c. Utilizing erosion control methods such as but not limited to re-vegetating the disturbed areas as soon as possible, erosion control mats, waddles, mulch, hydro-mulch, silt fences, water bars, eyebrow ditches, diversion ditches, wing ditches, gabion baskets or rip rap and any other method approved by the Authorized Officer.
- SRC will submit for BLM approval a request on Form 3160-5 before:
 - a. Undertaking any new construction outside the approved area of operations; or
 - b. Reconstructing or altering existing facilities including, but not limited to, roads, emergency pits, firewalls, flowlines, or other production facilities on any lease that will result in additional surface disturbance. If, at the time the original APD was filed, SRC elected to defer submitting information under Section III.E.3.d. (Location of Existing and/or Proposed Facilities) of Onshore Order Number 1, SRC will supply this information before construction and installation of the facilities. The BLM may require a field inspection before approving the proposal. SRC will not begin construction until the BLM approves the proposed plan in writing. SRC will certify on Form 3160-5 that they have made a good faith effort to provide a copy of any proposal involving new surface disturbance to the private surface owner in the case of split estate.

- The use of temporary protective surface treatment on disturbed areas will be applied on a case-by-case basis as project conditions warrant.
- Topsoil stored for a period longer than 90 days will not exceed piles of 3 feet in depth and will be seeded with a BLM approved seed mix to prevent wind and water erosion and to reduce the loss of microbial activity within the soil.
- Re-seed all disturbed areas with native species adapted to the site conditions and capable of providing protective soil cover. All seed will be certified weed free. When practical, reseeding of disturbed areas should include the use of locally harvested seed from comparable areas in Wyoming and surrounding states.
- Surface disturbance or development on slopes greater than 25 percent is prohibited, unless individual site plans are submitted to and approved by the Authorized Officer meeting the following requirements. Engineered drawings for construction, site drainage design, and final rehabilitation contours with a written rationale describing how the proposed controls will prevent slope failure and erosion while maintaining viable topsoil for final reclamation. This plan should also include a timeline identifying the actions that will be applied during the construction, production and rehabilitation phases of the plan so appropriate monitoring protocols can be developed by the BLM to ensure that the plan is meeting the objective described in its rationale.
- Proposed surface-disturbing activities will be modified (located) to avoid areas of highly erosive soils to the greatest extent practicable. When avoidance of highly erosive soils is not practicable SRC will submit an individual site plan to and be approved by the Authorized Officer meeting the following requirements. Engineered drawings for construction, site drainage design, and final rehabilitation contours with a written rationale describing how the proposed controls will prevent slope failure and erosion while maintaining viable topsoil for final reclamation. This plan should also include a timeline identifying the actions that will be applied during the construction, production and rehabilitation phases of the plan so appropriate monitoring protocols can be developed by the BLM to ensure that the plan is meeting the objective described in its rationale.
- Soil compaction will be remediated on all compacted surfaces prior to the redistribution of topsoil on disturbed surfaces to the depth of compaction by methods that prevent mixing of the soil horizons. BLM's recommended methods are subsoiling, paraplowing, or ripping with a winged shank Scarification is acceptable on areas identified as very shallow or shallow soils in the Master Surface Use Plan.
- All pit spoil will be placed back in the pit once the pit is dry or fluids are removed. Subsoil will then be replaced in the reserve pit before topsoiling.

Under no circumstances would any by-products from drilling or subsoil be spread on top of topsoil. The pit area should usually be mounded slightly or restored to the original contour to allow for settling and positive surface drainage.

- Earthwork for interim and final reclamation generally will be completed within 6 months of well completion or plugging (weather permitting).

4.6 Water Resources

4.6.1 Proposed Action

Hydrologic impacts resulting from surface disturbances associated with the proposed project would include the removal of vegetation, exposure of the underlying soil surface, and compaction of the soil. These impacts would result in an increased overland flow of surface runoff with subsequent erosion and off-site sedimentation. Consequently, these changes in the local environment could create the potential for increased stream flow, increased sediment loading and the subsequent degradation of both surface and subsurface water quality below acceptable standards if they are not properly controlled or occur in close proximity to a perennial stream or aquifer recharge point. Both the magnitude and duration of these impacts depend upon several factors, including:

- Slope aspect and gradient;
- Degree and extent of soil disturbance(s);
- Susceptibility of the soil to erosion;
- Proximity of the disturbance to existing stream channels; and
- Mitigation measures implemented.

Additional factors would include the duration of construction (surface disturbing) activities coupled with the timely implementation and subsequent success (or failure) of applicable reclamation measures. These potential impacts would be greatest after commencement of construction activities, but would begin to decrease shortly after completion of surface disturbing activities due to a combination of passive stabilization and implementation of erosion and sediment control measures as necessary to control runoff. The leakage or spillage of liquid hydrocarbons and/or other fluids/chemicals utilized during drilling/completion operations could also degrade both surface and ground water resources. The impact of such an occurrence would depend primarily upon the quantity and chemical composition of the fluid(s) released, the relative proximity of the spill to the water body potentially impacted, and mitigation measures implemented to control the event.

4.6.1.1 Surface Water Resources

The main impacts to surface-water resources from this project would be sediment loading caused by surface disturbance related to project development/maintenance and impacts brought about by contamination of surface water from 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 would be minimized through the implementation of BMPs, implementation of the SPCC plan, and compliance with other state and federal regulations. 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.

Impact from short- and long-term disturbance could increase the potential for erosion and off-site sedimentation but these impacts are not expected to be substantial.

Surface water impacts could also result from an increased water usage for operations (drilling, completion, and dust suppression). The proposed action could use an estimated 9.1 million bbls (1,168 ac-ft) of water over the life of the project. Water would be acquired from already appropriated sources, which could include valid surface water rights.

As stated in Section 3.7.1.3, approximately 308 acres of NWI delineated wetlands were identified within the SFD project area; a majority are along Lightning and Box creeks. Isolated freshwater pond wetlands were also associated with small stock water reservoirs in the SFD project area. SRC would utilize existing improved roads where possible and these roads are already established across Lightning and Box creeks. As such, the proposed SFD project would not result in a significant increase in wetlands impacts associated with these major drainages.

4.6.1.2 Groundwater Resources

Under the Proposed Action, groundwater resources could be impacted by increased water usage for operations (drilling, completion, and dust suppression) and by contamination. As described in Section 2.1.3.4, the proposed action could use an estimated 9.1 million bbls (1,168 ac-ft) of water over the life of the project. Water would be acquired from an already appropriated source or from a new water well permit (issued by WSEO to appropriate groundwater).

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 oil well drilling and completion activities. Leakage from freshwater 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.

As stated in Section 3.7.2.1 of this document, a review of the electronic records of the office of the WSEO revealed that there are 40 permitted non-industrial water wells within the SFD project area (WSEO 2012). As stated in Section 2.1.2, SRC intends to drill the surface hole (approximately 2,000 feet) and intermediate section (approximately 9,000 feet) for each oil well with a fresh water mud system. Steel surface casing would be set to approximately 2,000 feet. Following installation of the surface casing, intermediate casing would be installed through the Parkman Formation and overlying formations. Each casing string would be cemented in place from bottom to top, thereby significantly reducing any potential communication between and/or cross-contamination of the near surface water aquifers in the SFD project area. The use of a fresh water mud system to drill the surface and intermediate portions of each well would reduce any potential for contamination of fresh water aquifers from the OBM system utilized for drilling operations below 9,000 feet.

The potential for the contamination of near-surface aquifers from the use of OBM has been eliminated through the techniques outlined in Section 2.1.2, which include the use of a semi-closed mud system during the drilling operation combined with recycling of the OBM fluids and the solidification of the cuttings upon completion of operations. SRC would drill a test hole on the well location in those rare instances where groundwater may be encountered within twenty feet of the surface to determine the depth to groundwater. Should groundwater be encountered within 20 feet of the surface in the test hole, a closed mud system would be used during the drilling operation to prevent any shallow groundwater contamination in accordance with Chapter 1, Section 2(nn) and Chapter 4, Section 1(j) of the rules and regulations of the WOGCC (WOGCC 2010).

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 reuse of drilling fluids would be in accordance with BLM guidelines, which would minimize adverse effects on groundwater quality. Further, use and disposal of hydrostatic test water would comply with the mandatory right-of-way stipulation for hydrostatic testing as well as the POD, the CWA, and the WYPDES permit that would be required for the proposed project.

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 ac-ft). SRC anticipates that approximately 15,000 bbls of water would be required for dust abatement each year. Based on a maximum annual completion rate of 24 wells, the maximum annual water requirements would be approximately 1,345,000

bbls (approximately 173 ac-ft). Water would be acquired from an already appropriated source or from new water wells permitted by the WSEO to appropriate groundwater).

A central feature of the well completion process is HF, which involves injecting fracturing fluids into the target formation at a force exceeding the parting pressure of the rock, thus inducing a network of fractures through which oil or natural gas can flow to the wellbore. The fractures are filled with sand or other porous materials called proppants which keep the fractures open and facilitate hydrocarbon recovery. HF has been used by the oil and gas industry for decades. HF is currently excluded from Underground Injection Control regulation under the Safe Drinking Water Act (SDWA) except when diesel fuel is used as a component of the HF fluid, in which case, an EPA permit is required.

The EPA is currently conducting an industry-wide study that seeks to understand any potential relationships between HF and drinking water. As part of that study, the EPA issued information requests to leading national and regional HF service providers. The EPA is seeking information on the chemical composition of fluids used in the HF process, data on the impacts of the chemicals on human health and the environment, standard operating procedures at HF sites and the locations of sites where HF has been conducted (EPA 2011). No occurrences of drinking water contaminated by HF have been recorded in the project area and no studies related to impacts from HF have been conducted in the SFD 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), groundwater resources near the surface, such as springs, shallow alluvium, and domestic wells would not be affected.

Impacts to spring and seeps related to groundwater removal would be negligible since the source aquifers for the springs and seeps are stratigraphically higher than the oil and natural gas exploration targets.

With the use of state-of-the-art drilling and well-completion techniques and implementation of drilling BMPs and COAs, impacts related to degradation of groundwater quality would be negligible. In addition, the likelihood of comingling of groundwater from distinct aquifers, which could occur during the relatively short period of time during drilling, would be low and impacts would not be considered significant.

4.6.3 *The No Action Alternative*

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development and impacts to water resources associated with the existing mineral development in the area would continue.

The SFD project No Action Alternative would result in an estimated maximum disturbance of approximately 258 acres of soils and vegetation. Interim reclamation would reduce the long-term disturbance associated with the No Action Alternative to approximately 91 acres. Impact from short- and long-term disturbance could increase the potential for erosion and off-site sedimentation but these impacts would be less than the Proposed Action.

Using the estimates of water required for the various phases of well drilling and completion described above, an estimated total water requirement for the 15 wells that could be drilled under the No Action Alternative would be approximately 831,000 bbls of water (approximately 107 ac-ft). Water would be acquired from an already appropriated source or from new water wells permitted by the WSEO to appropriate groundwater).

Other impacts to surface and groundwater resources would be similar to those described above, but would also be on a lesser scale.

4.6.4 *Mitigation and Monitoring*

In order to minimize the overall impact to water resources within the SFD project area that could result from surface disturbing activities associated with the Proposed Action, SRC proposes the following mitigation measures:

- Construction at drainage crossings would be limited to periods of low or no flow;
- Pitless drilling technology would be used on BLM-authorized drilling activities, where all wells would have surface casing set and cemented to isolate the water bearing zones according to state and local agencies and the BLM authorized officer;
- Well pads and access roads would be located, engineered, and constructed to minimize sediment load of surface water runoff;
- Road drainage crossings (culvert installations) would be of the typical dry creek drainage crossing type. Crossings would be designed so they would not cause siltation or accumulation of debris in the drainage crossing, nor would the roadbed block the drainages;
- Erosion of drainage ditches by runoff water would be prevented by diverting surface water at frequent intervals by use of cutouts. Subsequent reclamation

activities would substantially reduce surface exposure and therefore decrease long-term impacts on surface waters;

- A watershed analysis will be completed for each crossing to assess whether a culvert is needed and the proper sizing;
- SRC would follow all practical alternatives and designs to limit disturbance within drainage channels, including ephemeral and intermittent draws;
- Channel crossings by roads and pipelines would be constructed perpendicular to flow and would not run parallel to ephemeral and intermittent channels;
- Disturbed channel beds would be reshaped to their approximate original configuration;
- All cuttings pits would be constructed with 100 percent of the total depth of the pit below the finished grade of the well location. Pit volumes would be calculated to allow for a minimum of 4 feet of overburden on the solidified cuttings upon pit closure;
- All cuttings and HF water pits would be designed with a minimum of 2 feet of freeboard; and
- The discharge of all water (storm water, produced water, etc.) would be done in conformance with applicable WDEQ, BLM, and WOGCC rules and regulations.

4.7 Wildlife

4.7.1 *The Proposed Action*

4.7.1.1 *Big Game Species*

Impacts to big game species would include the loss of yearlong and winter/yearlong habitat, including forage areas as well as protective cover, and the displacement of individuals and groups from portions of the SFD project area where human activity and use of vehicles, equipment and construction occur, including associated noise impacts.

Increased traffic volume on roads within and near the SFD project area may increase the likelihood for vehicle-wildlife collisions with big game species, particularly during the construction and drilling periods. Likewise, an increased human presence is likely to increase the potential for human-wildlife interactions including, but not limited to, harassment of wildlife and possibly poaching. However, in some cases, wildlife may habituate to human related disturbances (i.e., noise and presence) after initial exposure and begin to use areas that were initially avoided. Surface disturbance associated with the Proposed Action would result in a direct loss of up to approximately 686 acres of potential pronghorn and mule deer habitat in the short-term and approximately 242 acres in the long-term (45 to 50 years) or until final reclamation is conducted successfully. No impacts to crucial winter range or parturition areas would occur for either big game species.

Since no crucial ranges or migration corridors are located in or within 6 miles of the SFD project area, impacts via displacement are expected to be minor. Impacts to big game populations would be negligible.

4.7.1.2 Migratory Birds

Many species of migratory birds (raptors and passerines) may forage or nest within the SFD project area. Impacts to migratory birds (Table 3-12) would be similar for all species of migratory birds; however, the impacts may vary depending on loss of habitat types and how sensitive each species is to disturbance (BLM 2012d). Approximately 686 acres of vegetation potentially used for foraging and/or nesting habitats would experience initial disturbance under the Proposed Action, and 242 acres of long-term disturbance (45 to 50 years) or until final reclamation is conducted successfully. Approximately 44 percent of the overall SFD project area is mixed grass prairie cover type and approximately 43 percent is Wyoming big sagebrush cover type. If mitigation and reclamation efforts are successful, along with preventive weed control, adverse impacts to migratory birds would be minimal. Construction and operation of well pads would remove potential habitat for the estimated life of the project, but would not affect the overall health of migratory bird populations at the regional scale.

Other impacts to migratory birds would depend on the timing of construction, drilling, and completion activities associated with the Proposed Action. If these activities are conducted in the late fall, many of these migratory bird species would have left the SFD project area for their wintering grounds and thus most of the impacts to migratory birds would be avoided. The opposite is true if these activities are conducted during the spring and summer months as migratory bird species arrive and breed in the SFD project area. This could result in nest abandonment or unsuccessful nests and overall displacement of breeding pairs (BLM 2012d).

4.7.1.3 Raptor Species

The potential impacts to raptor species include nest abandonment and/or possible reproductive failure due to nearby project activities or increased public access, possible reductions in prey populations, mortality from vehicle-bird collisions, and the loss of nesting and/or foraging habitat.

Generally, raptors return to areas where they have nested in the past, often using the same nesting territories. Nesting activities may be initiated in mid-February to late-April depending on the species. Nest occupation continues until chicks are fledged, which usually occurs from early June to mid-August. Raptor nesting is known to occur in suitable habitat within and adjacent to the SFD project area. Avoidance of disturbance near existing nest sites and minimizing disturbance to the mixed grass prairie and Wyoming big sagebrush complexes to the extent possible would reduce potential impacts on nesting and/or foraging raptors.

Project development would disturb habitat for possible raptor prey species. The amount of short-term change in prey base populations created by construction is

expected to be minimal in comparison to the overall level of small mammal populations. While prey populations on the Project Area would likely sustain some reduction during the development phase of the project, most prey species would be expected to rebound to pre-disturbance levels following initial reclamation. For these reasons, no measurable long-term reduction to the prey base is anticipated.

Many raptors feed on carrion along major and minor roads within the SFD project area, while others (i.e., owls) may attempt to hunt small rodents or insects that are illuminated in headlights. These behaviors put them in the path of oncoming vehicles where they are at risk of collisions. The potential for such collisions could be reduced by requiring that drivers receive guidance and/or training that describes the circumstances under which vehicular collisions are likely to occur and possible measures to minimize collisions.

4.7.1.4 Threatened, Endangered, and Candidate Species

As discussed in Section 3.8.4, there are six threatened, endangered, or candidate species of mammal, bird, and fish species that are listed as potentially occurring in Converse County. The status and effects determination of these six species is provided in Table 4-2.

Table 4-2. Potential Occurrence and Effect Determination of Endangered, Threatened, and Candidate Wildlife Species that May Occur within the SFD Project Area

Common Name	Scientific Name	Status ¹	Habitat	Potential Occurrence	Effect ²
Mammals					
Preble’s Meadow Jumping Mouse	<i>Zapus hudsonius preblei</i>	T	Lush vegetation along watercourses	Not Present	NE
Birds					
Greater Sage-grouse	<i>Centrocercus urophasianus</i>	C	Sagebrush	Likely	NA
Platte River Species of Critical Concern					
Least Tern	<i>Sterna antillarum</i>	E	Sandbars along rivers	Not Present	NE
Piping Plover	<i>Charadrius melodus</i>	E	Sandbars along rivers	Not Present	NE
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	E	Deep, fast rivers	Not Present	NE
Whooping Crane	<i>Grus Americana</i>	E	Freshwater marshes	Not Present	NE

¹ E = Endangered, T = Threatened

² NE = No Effect, NA=Not Applicable (Candidate species do not get an effects call)

Source: USFWS (2012)

The Preble’s meadow jumping mouse has not been documented on or near the SFD project area, and within the proposed SFD project area the Preble’s meadow jumping mouse is modeled as having a “very low probability of occurrence.” The next closest

modeled habitat is approximately 7 miles to the south of the SFD project area along the North Platte River and is designated as “medium probability of occurrence” for Preble’s. The Preble’s meadow jumping mouse is unlikely to occur within the SFD project area and the Proposed Action will have “no effect” on the species.

Greater sage-grouse have undergone a recent status review by the USFWS in response to petitions requesting the listing of this species, across its range, under the ESA. A decision was released in 2009 and the sage-grouse was warranted but precluded for listing under the ESA. The greater sage-grouse remains a candidate species. Human activities during the breeding season may disrupt normal use of leks and subsequently affect local breeding success. Impacts with the potential for the greatest negative effects to greater sage-grouse populations include loss of nesting or brood-rearing habitat, displacement or additional stress due to increased human activities, excessive noise levels proximal to occupied leks, and removal or modification of critical winter habitats. However, there are no core population areas or identified winter habitats associated with the project area and the nearest known occupied lek is more than 3.5 miles from the SFD project area. Sage-grouse are dependent upon sagebrush habitats for their year-round survival. This dependency includes using sagebrush for forage, nesting habitat, brood-rearing habitat, and winter thermal cover. Although less than 50 percent of the SFD project area is classified as sagebrush habitat, sage-grouse are likely use the area occasionally for foraging and brood-rearing habitat. Due to the lack of core population areas, lack of any identified leks, and lack of identified winter habitat associated with the SFD project area, this project will have negligible impacts to the greater sage-grouse.

Platte River Species

The least tern and the piping plover have not been documented, breeding or otherwise, in or around the SFD project area. Furthermore, habitat is marginal at best because these two species are North Platte riverine species that require barren to sparsely vegetated sandbars along rivers, lakes, and reservoir shorelines. The nearest habitat for these two species occurs along the North Platte approximately 7 miles to the south of the SFD project area.

The pallid sturgeon has not been documented on or around the SFD project area. Furthermore, habitat seems to be absent from the project area because this species is a North Platte riverine species that requires deep, fast, turbid waters. The nearest habitat for this species occurs along the North Platte approximately 7 miles south of the SFD project area.

The whooping crane is not likely to be affected by the Proposed Action. This species primarily uses freshwater marshes, wet prairies, and shallow sections of rivers, lakes, and reservoirs, with overnight roosts usually occurring in shallow water on unvegetated sandbars (Travsky and Beauvais 2005a). The WOS (WGFD 2012) and the WYNDD sensitive species database (WYNDD 2012) have no records of whooping cranes occurring in or near the SFD project area. The nearest available habitat occurs

on the North Platte River approximately 7 miles from the southern end of the SFD project area.

Therefore, the project would have “no effect” on the least tern, piping plover, pallid sturgeon, or whooping crane. However, a formal consultation with the USFWS would need to be conducted at the APD stage if it is determined that water would be obtained from a hydrologically connected sub-basin of the upper Platte River Basin and if water withdrawals would exceed 0.1 acre/foot per year.

4.7.1.5 BLM Sensitive Wildlife

As discussed in Section 3.8.5, there are 7 BLM sensitive mammal species that may potentially be found in the SFD project area (Table 3-13). They include the Townsend’s big-eared bat, the spotted bat, long-eared myotis, fringed myotis, swift fox, white-tailed and black-tailed prairie dogs. The Townsend’s big-eared bat is not discussed because it is not likely to occur in the SFD project area and the spotted bat is not discussed because its range does not overlap the SFD project area or the 6 mile area around the SFD project area. For the same reasons, the fringed myotis is also not discussed; there are no historic or current observations documented for Converse County, Wyoming for this species. No known prairie dog towns (white-tailed or black-tailed) are known to occur in or around the SFD project area, thus neither species is discussed below. This also indicates that there is no suitable Black-footed ferret habitat with the general SFD project area boundaries.

Impacts to swift fox could include vehicle-fox collisions due to an increase in roads and road construction; habitat loss, fragmentation and alteration; as well as an increase in noise levels associated with increased human activity. However, if mitigation strategies are successful, especially the reclamation of native grassland habitat, the impacts to swift fox populations would be negligible.

There are 15 BLM sensitive bird species that may be found within the SFD project area (Table 3-13). These include the northern goshawk, the Baird’s sparrow, sage sparrow, sage thrasher, Brewer’s sparrow, burrowing owl, ferruginous hawk, mountain plover, yellow-billed cuckoo, trumpeter swan, peregrine falcon, bald eagle, loggerhead shrike, white-faced ibis, and the long-billed curlew. The northern goshawk, yellow-billed cuckoo, trumpeter swan, peregrine falcon, and white-faced ibis are unlikely to occur in the SFD project area, and therefore are not discussed.

Mountain plover have not been observed in or around the SFD project area and little to no suitable habitat currently occurs within the project area. During the life of the project, overgrazing or fire in the relatively flat portions of the project area could create suitable habitat for nesting mountain plover. However, if mitigation measures are implemented during the breeding season, impacts to nesting mountain plover would be minimal.

The Brewer’s sparrow, sage sparrow, and sage thrasher are all known to occur within the SFD project area. All three species are sagebrush obligates, which means that

they require sagebrush to survive in one form or another (e.g., food, cover, breeding, etc.), mostly for nesting and shelter (Williams et al. 2011). These species can also be sensitive to anthropogenic and natural disturbances. However, if all avoidance and mitigation measures can be accommodated, impacts to these species are expected to be minimal.

Impacts to bald eagles and ferruginous hawks would be the same as those described above under the “Raptors” section.

There have been eight observations of burrowing owls on or around the SFD project area; however, no documented observations have occurred within the SFD project area. The absence of both white-tailed and black-tailed prairie dog colonies within the project area greatly reduces the likelihood of adequate nesting habitat for the burrowing owl. Indirect negative impacts could include displacement from foraging areas and a possible reduction in prey abundance. However, if mitigation measures are implemented, impacts would not be severe.

Impacts to Baird’s sparrow, loggerhead shrike, and long-billed curlew populations would be the same as those described under the “Migratory Birds” section.

Only one documented observation of a white-faced ibis has been recorded within the SFD project area. There is a moderate chance that this species may occur within the SFD project area; however given the absence of suitable habitat (i.e., wetland, riparian areas, and shallow marshes), occurrence is unlikely. Potential impacts to white-faced ibis habitat include alteration to, or activity within, bodies of water that could serve as potential habitat.

4.7.2 *The No Action Alternative*

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development and impacts to big game, migratory birds, raptors, threatened or endangered, or BLM sensitive species populations associated with the existing mineral development in the area would continue.

The SFD project No Action Alternative would result in an estimated maximum disturbance of approximately 258 acres of wildlife habitat. Interim reclamation would reduce the long-term disturbance associated with the No Action Alternative to approximately 91 acres. Impacts to wildlife species similar to those described above would occur, but on a lesser scale.

4.7.3 *Mitigation and Monitoring*

To minimize the overall impacts to wildlife species within the SFD project area that could result from surface disturbance activities associated with the Proposed Action, SRC proposes the following mitigation measures:

- Provide all drivers with information and possible training describing the types of big game wildlife species in the area that are susceptible to vehicular collisions to reduce the potential for vehicle-big game collisions.
- To avoid collision and electrocution of raptors and other avifauna, power lines would be constructed in accordance with standards outlined in the Avian Protection Plan Guidelines (APLIC 2006).
- Avoidance of disturbance near existing nest sites and minimizing disturbance to the mixed grass prairie and Wyoming big sagebrush complexes to the extent possible and acceptable to the BLM would reduce further potential impacts on nesting and/or foraging migrating species. Construction of well pads on areas that are in less suitable habitat (e.g., along existing roadways or within potentially degraded habitats), would further reduce potential impacts.
- In order to protect important raptor nesting habitat, activities or surface use will not be allowed from February 1 to July 31 within 0.25 to 0.5 mile of occupied raptor nests depending on species. Occupied nests will remain protected until all young have fledged and left the nest area.
- Raptor surveys will be conducted during the breeding season prior to breaking ground with construction. If an active nest is located, appropriate BLM timing and spatial restriction stipulations will be applied. Any new nests discovered during work should be reported within 24 hours by phone or email to the BLM Natural Resource Specialist responsible for raptor monitoring oversight in the CFO.
- Surface disturbing and/or disruptive activities will be restricted from April 10 to July 10 if suitable mountain plover breeding and nesting habitat is present within $\frac{1}{4}$ mile of the proposed action. Surveys will be conducted during the breeding season for the presence or absence of mountain plover if ground disturbing activity is planned in potential mountain plover habitat.
- In order to protect potential greater sage-grouse habitat, disturbance in sagebrush vegetation types will be minimized. In the event that a new lek is discovered, surface disturbance and/or occupancy will be avoided within 0.25 mile of the perimeter of an occupied lek to protect breeding habitat.
- Surface disturbing and disruptive activities will be avoided from March 15 to July 15 in suitable greater sage-grouse nesting and brood-rearing habitats within 2 miles of an occupied lek.
- Ensure that construction, drilling, and completion activities are minimized in riparian corridors, and ensure that well pads are located at least 500 feet from

any riparian area. Any roads or pipelines that cannot be re-routed should cross riparian zones in a manner that would minimize disturbance.

4.8 Transportation

4.8.1 *The Proposed Action*

Under the Proposed Action, traffic levels would likely increase for the next 5 to 10 years. The amount of traffic would be dependent on a number of factors, including the success of future drilling, energy prices, rig availability, etc. When development is complete, light duty vehicle (crew trucks, consultant vehicles, etc.) use would decline, but truck traffic associated with oil and water transport would continue into the foreseeable future or until an oil pipeline is brought into the project area.

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.

Assuming that the 150 wells under the Proposed Action are successful, and produce on average 150 bbl/day of oil and 30 bbl/day of water, daily production in the field could reach a maximum 22,500 bbl/day oil and 4,500 bbl/day water. Based on SRC's experience in the area a 5 to 10 year drilling period 12 to 24 wells per year would be completed. Assuming the use of transport trucks with 200 bbl capacity, daily truck traffic could be calculated with the number of additional wells that reach production status on an annual basis.

Assuming that 12 to 24 wells per year are completed, and production rates are in line with projections, daily haulage traffic would increase by 11 to 22 truckloads each year. Tanker trucks with 200 bbl capacity would be the primary mode of transportation for produced oil and water until field-wide production becomes economically feasible to support installation of a pipeline gathering system.

During drilling operations daily light duty traffic could range from 7 to 13 trips for each well, depending on the activity. With three operating rigs this would equate to a maximum of 39 trips per day. This increase in amount of traffic could cause deterioration of existing roadways; however potential deterioration could be offset by increased repair and maintenance.

4.8.2 *The No Action Alternative*

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would

continue to be available for leasing, exploration, and development and traffic related impacts associated with the existing mineral development in the area would continue.

A minimum of 15 new wells would be drilled on 15 single-well pads under the SFD project No Action Alternative, which would result in an increase in traffic. Impacts to transportation similar to those described above would occur, but on a lesser scale.

4.8.3 Mitigation and Monitoring

If a fugitive dust problem is identified as a result of the increased traffic related to the Proposed Action, immediate abatement measures (e.g., applications of water or chemical dust suppressants to disturbed surfaces) would be initiated in consultation with the BLM and WDEQ to avoid excessive dust on gravel roads.

4.9 Noise

4.9.1 The Proposed Action

Under the Proposed Action, up to 150 new wells would be added resulting in additional short-term noise from construction activity, drilling and completion activity, and traffic. Long-term noise would result from traffic and production equipment.

Noise in the workplace would be under the regulation of the Occupational Safety and Health Administration (OSHA). OSHA safety standards have been adopted by the State of Wyoming. However, there are no regulations specified by the WOGCC for the amount of resonating noise from drilling operations. These operations could last from 5-10 years.

Noise can be directionally modified with atmospheric differences in temperature, humidity, and wind. The general topography of the area also affects how noise is perceived away from the source. Well pad locations within the SFD project area that are in draws will produce less noise than locations that are situated on higher ground, due to the absorption of noise by the surrounding hillsides. This will provide some relief from higher dBA values associated with heavy machinery or production equipment. Under the authority of the Noise Control Act of 1972, the EPA has indicated that exposure to noise levels of less than 70 dBA for a continuous 24 hours prevents auditory damage and 55 dBA does not pose a risk for impact (EPA 1974). A noise level of 65 dBA is considered unacceptable at a place of residence and noise levels should not exceed this value (HUD 1996). A predetermined acceptable decibel value should range from 30 to 55 dBA and may need to be modified during nighttime hours. Also, any resonating sound that is 10 dBA over the background noise level is considered a major hindrance (EPA 1974).

There are eight structures associated with two residences within the SFD project area. Since the actual locations for the 40 pads included in this EA have not been determined at this time, only general noise related impacts to residences from

construction and drilling activities associated with the Proposed Action are discussed. Setback distances and monitoring would be negotiated with Landowner.

Standard construction techniques using appropriate heavy equipment would be used to build well fields and buildings and to grade access roads for well pads. Drill rigs, construction vehicles, heavy trucks, bulldozers, and other equipment used to construct and operate the well fields, drill the wells, develop the necessary access roads, and build the production facilities would generate noise that would be audible above the current background levels. Representative noise levels for the equipment that would be utilized under the Proposed Action are presented in Table 4-3.

Table 4-3. Noise Levels for Construction/Production Equipment

Study	Equipment Type	Noise Level (dBA)	Noise Level (dBA)
ISR GEIS ¹	Heavy Truck	82-96	24-38
	Bulldozer	92-109	34-51
	Grader	79-93	21-35
	Excavator	81-97	23-39
	Crane	74-89	16-31
	Concrete Mixer	75-88	17-30
	Compressor	73-88	15-30
	Backhoe	72-90	14-32
	Front Loader	72-90	14-32
	Generator	71-82	13-24
	Jackhammer/Rock Drill	75-99	17-41
BLM ³	Drill Rig	63	29
SRC ⁴	Three Ajax® Engines/Pad Configuration	65	26
	Six Ajax® Engines/Pad Configuration (estimate)	66	31

¹ At 50 feet and 2,500 feet: from ISR Generic Environmental Impact Statement (GEIS) (NRC 2009) - Table 4.2-1.

² Based on 1999 BLM Noise Analysis (BLM 1999).

³ At 40 feet and 1,280 feet – engines muffled: from SRC 2012 noise study.

Based on results from the baseline measurements, a series of three muffled Ajax® gas motors and pumping equipment emits noise at 64.5 dBA at a distance of 40 feet. At 1,280 feet, noise dissipates to 31 dBA, which is the natural daytime baseline. Using noise compounding formulas, six Ajax® units with silencers would produce an average of 66 dBA at 40 feet compared to 65 dBA at 40 feet from a three well installation.

Utilization of up to six muffled motors per pad could increase the distance for dissipation to noise of baseline levels from 1,280 feet to a theoretical maximum of 2,500 feet, which does not account for mitigation by terrain or atmospheric variables.

Upon completion of drilling and construction, the initial noise levels would diminish. Long-term noise would remain. Short- and long-term impacts from noise resulting from the Proposed Action would be negligible if SRC implements the noise related mitigation measures listed below.

4.9.2 *The No Action Alternative*

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and noise related impacts associated with the existing mineral development in the area would continue.

A minimum of 15 new wells would be drilled on 15 single-well pads under the SFD project No Action Alternative, which would produce additional noise related impacts. Impacts from the additional noise would be similar to those described above would occur, but on a lesser scale.

4.9.3 *Mitigation and Monitoring*

The EPA has indicated that exposure to noise levels of less than 55 dBA does not pose a risk for impact (EPA 1974). Potential noise impacts at the various residences can be mitigated by the distance between residences and the well pads. Analysis indicates that noise emanating from well pads attenuates to baseline (31 dBA) between 1,280 and 2,500 feet, depending on the number of wells per location and the method of pump jack operation. In addition to distance, topography plays a role in mitigating noise. In instances where distance and topography cannot mitigate noise perceived at a residence SRC has a policy of mitigating noise using additional engineering or policy controls, examples of which are the equipment mufflers and limiting the use of engine brakes on heavy trucks utilized by SRC.

4.10 Visual Resources

4.10.1 *The Proposed Action*

The current natural scenic quality in and near the SFD project area is fairly low because of the industrial nature of the oil and gas field development. This proposal would be an infill development project. The SFD project area is located within a VRM Class IV area and as such, the allowable level of change to the characteristic landscape can be high. The Proposed Action would create surface disturbance of 686 acres, or 1.5 percent of the project area. Most of the disturbance would be for well pads, structures, and roads. Interim reclamation would reduce surface disturbance to 242 acres, or 0.5 percent of the project area, which would remain as open disturbance for the life of the project, after which facilities would be removed and final reclamation would begin. Impacts to visual resources resulting from the Proposed Action are consistent with the Class IV designation and would be negligible if SRC implements the visual resource related mitigation measures listed below.

4.10.2 The No Action Alternative

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, impacts to visual resources associated with the existing mineral development in the area would continue.

A minimum of 15 new wells would be drilled on 15 single-well pads under the SFD project No Action Alternative, which would produce additional visual impacts. The visual impacts similar to those described above would occur, but at a much lower magnitude.

4.10.3 Mitigation and Monitoring

As determined from SRC information, approximately 3,980 acres (8.92 percent) of the SFD project area is composed of state and federal lands, which limits the extent of public use of the SFD project area. In general the following practices would be used to mitigate visual impacts.

BMPs are general guidelines set forth by the BLM to aid in the identification and mitigation of certain practices and aspects of a project. These guidelines pertaining to the visual resource aspect of a project can decrease visual pollution and aid in the acceptance of the overall permitting process and the effectiveness and cost of reclamation. Some of these guidelines are:

- The use of existing roads;
- Upgrading and maintaining existing roads as necessary;
- Keeping sites clean;
- Requiring fire extinguishers in all vehicles to reduce the potential for fires, which, if large enough, would be visually distracting;
- Painting facilities to blend into the landscape (VRM Standard Environmental Color Chart);
- The use of natural topography or berms to screen facilities;
- Conducting snow removal in a manner to avoid impacts to the surface and subsurface;
- Planning transportation needs to reduce vehicle density;
- Burying of new utility lines, utilizing the plow/pull method;
- Grouping equipment at the entrance of the pad and reducing barren areas on the pad by conducting interim reclamation;
- Revegetating borrow ditches to avoid accelerating erosion; and

- To the extent possible, revegetating the well pad disturbance to blend the disturbance with native ground as soon as possible.

Implementation of these techniques can help provide a better experience for the primary viewer, the public. The BMPs that are deemed fit for the project will be employed throughout the entire phase of the industrial process.

4.11 Waste and Hazardous Materials Management

4.11.1 The Proposed Action

Hazardous materials that would be used at drilling site may include drilling mud and cementing products, fuels, flammable or combustible materials, and corrosive acids and gels. Under the Proposed Action, 150 new wells would be added resulting in additional potential initial impacts from the hazardous materials utilized during drilling process. Impacts from hazardous or solid wastes resulting from the Proposed Action would be negligible if SRC implements the mitigation measures listed below.

SRC (and its subcontractors as applicable and appropriate) is required to comply with all applicable state and federal programs which are intended to reduce risk to human health and the environment from the use, storage, and transportation of hazardous materials. Implementation of the Proposed Action would require updating these program plans.

Impacts from hazardous or solid wastes resulting from the Proposed Action would be negligible if SRC implements the plans listed above.

4.11.2 The No Action Alternative

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development and impacts to public health and safety associated with the existing mineral development in the area would continue.

Impacts from hazardous or solid wastes used at the drill sites for the 15 oil wells that could be drilled on leases not held by production within the SFD project area would be similar to those described above would occur, but on a lesser scale.

4.11.3 Mitigation Measures

SRC and its contractors are obligated to operate in compliance with applicable local, state, and federal regulations. BLM recognizes these authorities and requires compliance with the applicable regulations.

Compliance with and implementation of the required plans would reduce the risk to human health and the environment from hazardous material releases in the project area.

- A Hazard Communications Program (Haz-Com or Worker Right-to-Know) is required by OSHA and is intended to reduce the risk of occupational exposure to hazardous materials.
- A Community Right-to-Know (the Superfund Amendments and Reauthorization Act, or the Emergency Planning and Community Right-to-Know Act), required by the EPA, is intended to provide state and local emergency responders with information regarding the material hazards, location, and volumes of material that may be encountered when responding to an emergency.
- Spill Prevention, Countermeasure, and Control Plans are required by EPA and are intended to preclude the release of oils, such as diesel fuel, gasoline, crude oil, or condensate, into the waters of the United States; these plans must also provide response actions to be taken, and notifications to be made, in the event a release occurs.
- Emergency Response Plans are required by the BLM; these plans provide the BLM and operations personnel information about actions to be taken in the event an emergency situation (accidental fire, chemical or oil releases, well blow-out, etc.) should arise. These documents would be updated to include increased operations resulting from implementation of the Proposed Action.

4.12 Public Health and Safety

4.12.1 *The Proposed Action*

Potential public health and safety impacts associated with the Proposed Action would be similar to those associated with existing conditions in the project area. Public health and safety is addressed in SRC's SPCC plan and AST plan, as mandated by both federal and state regulations through the EPA and the WDEQ.

The greatest potential for health and safety impacts includes the occupational hazards associated with oil and gas exploration and development. The remote nature and low public use of the project area reduces the opportunity for development and production-related hazards to impact the general public.

4.12.2 *The No Action Alternative*

Under the No Action Alternative, the currently proposed 150 new wells within the project area would not be approved at this time. In the absence of the Proposed Action, federal oil and gas mineral resources throughout the project area would continue to be available for leasing, exploration, and development and public health

and safety related impacts associated with the existing mineral development in the area would continue.

4.12.3 Mitigation Measures

Drilling of federal minerals is subject to the BLM's Onshore Oil and Gas Orders (43 CFR Subpart 3164 – Special Provisions). BLM Onshore Order Nos. 1 and 2 requires that activities must protect public health and safety. SRC will have an emergency/contingency plan that addresses public health and safety in the event of an accident or unforeseen circumstance warranting immediate response.

5.0 CUMULATIVE IMPACTS

5.1 Introduction

CEQ regulations require an assessment of potential cumulative impacts. Cumulative impact is defined by those regulations at 40 CFR 1508.7 as:

“the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”

Potential cumulative impacts for each affected resource are assessed in this section. The discussion of potential cumulative impacts assumes the successful implementation of the environmental protection and mitigation measures described in Section 4.0 of this EA, as well as compliance with the Casper RMP and all applicable federal, state, and local regulations and permit requirements.

The cumulative impacts for resources will be evaluated relative to the potential area of cumulative impacts and may vary according to the resource. The cumulative impacts analysis for most resources will be analyzed using the area included in the 385,900-acre Highland Loop EA, which will be referred to as the Cumulative Impacts Area (CIA). The CIA encompasses the 44,619 acre SFD project area. The cumulative impacts for air quality will compare the anticipated impacts within CIA relative to Converse County (2,793,600 acres) and the High Plains District jurisdictional area (20,900,000 acres). The cumulative impacts for surface water will be evaluated relative to the 646,400 acre Lightning Creek drainage basin and the cumulative impacts for groundwater resources will compare impacts from the CIA relative to Converse County.

This EA tiers to, and incorporates by reference, the recently approved Highland Loop EA. The Highland Loop EA cumulative effects differentiated the existing oil and gas development with the project area for consideration of past and present actions as those occurring prior to ROD/RMP (December 2007) and those that occurred after the

ROD/RMP, utilizing the spud date on record. This distinction was used to help distinguish between the existing development and new projections calculated in the ROD/RMP. As a result, the Highland Loop EA indicated no new wells occurring after RMP approval in December 2007.

For the purposes of this environmental analysis, it was assumed that any permanently abandoned wells have been successfully reclaimed and no longer represent long-term surface disturbance within the CIA. It was also assumed that the current disturbance within the CIA is a result of ongoing activities, short-term disturbance has been reclaimed, all remaining disturbance is long term and is accounted for in the ROD/RMP. As such, this document does not contain any new discussion of past and present development.

Additionally, available aerial imagery covering the CIA indicates non-road linear features that are somewhat discernible. These features are assumed to be either underground electrical corridors or natural gas gathering pipeline corridors. For purposes of the cumulative impact analysis, it was assumed that the existing corridors have been successfully reclaimed and are not considered in existing disturbed area calculations.

Using these assumptions, the anticipated surface disturbance within the CIA resulting from previously approved oil/gas exploration and development activities as well as proposed oil/gas activities within the CIA is quantified as follows:

- 524 acres of short-term and 280 acres of long-term pad disturbance associated with the known 80 applications for future wells (47 federal and 33 non-federal), as indicated in the Highland Loop EA, within the portion of the CIA outside of the SFD project area (BLM 2012b).
- 970 acres of short-term and 552 acres of long-term pad disturbance associated with the 37 pads/148 wells approved under the Highland Loop EA (BLM 2012b).

No Action Alternative:

- 258 acres of short-term and 91 acres of long-term disturbance associated with the 15 leases not held by production within the SFD project area (using the estimated per pad short- and long-term SFD project disturbance found in Table 2-1, which includes pads, roads, and pipelines).

Proposed Action Alternative:

- 686 acres of short-term and 242 acres of long-term disturbance associated with the 40 pads/150 well proposed in the SFD project (Table 2-1).

A side-by-side comparison of the incremental cumulative impacts in anticipated acres of disturbance of the RFFA when added to the no action and the proposed action existing and proposed disturbance within the SFD CIA is provided in Table 5-1.

Table 5-1. Sources of Surface Disturbance in the SFD CIA

Source of Disturbance	No Action Alternative		Proposed Action Alternative	
	Disturbance in Acres ¹		Disturbance in Acres ¹	
	Short Term	Long-Term	Short Term	Long-Term
RFFA (228 wells ²)	1,494	832	1,494	832
No Action Alternative (15 wells)	258	91		
Proposed Action (150 wells)				
New Well Pads (40)			237	175
Proposed Access Road			96	67
Proposed Pipelines: 49.9 miles 25' ROW Width			151	0
Proposed Pipelines: 33.3 miles 50' ROW Width			202	0
Proposed Action Sub-Total			686	242
SFD CIA Grand Total	1,752	923	2,180	1,074

¹ The short- and long-term acres were derived from acres presented in the Highland Loop EA (BLM 2012b) and in Table 2-1.

² Includes 80 wells from Highland Loop Road RFFA and 148 wells approved in the Highland Loop EA.

According to the Highland Loop EA, there were approximately 39,500 producing oil and gas wells in the High Plains District jurisdictional area in 2010 (BLM 2012b). The Proposed Action of 150 wells combined with the 228 other wells in the CIA (leases not held by production within the CIA – 80 and added by Highland Loop EA – 148) equals 378 wells, which represents a 0.96 percent increase in the number of wells within the High Plains District jurisdictional area.

The cumulative effects by resource for the Proposed Action and the No Action Alternative relative to the CIA are provided in Table 5-2.

5.2 Air Quality

5.2.1 Proposed Action

Cumulative air quality impacts resulting from the Proposed Action could extend beyond the boundary of the CIA defined above and includes Converse County and the High Plains District jurisdictional area. Cumulative air quality-related emissions would include PM₁₀, SO₂, NO₂, CO; and O₃, which is created by chemical reactions between NO_x and volatile organic compounds (VOCs) in the presence of sunlight. These emissions would result primarily from construction, drilling, and completion activities; from handling of produced oil (product flashing and tank truck loading); and from emissions from gas engines used to operate well pumping equipment.

Converse County, which includes the CIA, is currently considered to be in attainment with National and State of Wyoming Ambient Air Quality Standards (EPA 2012 and

Table 5-2. Cumulative Effects for the SFD CIA

Resource	Cumulative Increment	NO ACTION ALTERNATIVE Combined total = 15 wells	PROPOSED ACTION Combined total = 40 well pads/ locations with 150 wells
<i>Air Resources</i>	<i>(RFFA) (+)</i>	The 228 wells in the RFFA represent an increase of 0.58 percent from the total wells (39,500) included in the High Plains District air analysis area and assuming steady production and emission venting these wells could produce 0.046 MMt of GHG emissions annually.	
	<i>Incremental Effect of Alternatives (+)</i>	This alternative has the potential for a combined 15 new federal wells across the CIA. The 15 wells would represent an increase of 0.04 percent from the total wells (39,500) included in the air quality analysis. Assuming steady production and emission venting these wells could produce 0.003 MMt of GHG emissions annually.	Under this alternative, a combined 150 new federal wells would be constructed on 40 well pads/locations across the project area. The 150 wells would represent an increase of 0.38 percent from the total wells (39,500) included in the air quality analysis. Assuming steady production and emission venting these wells could produce 0.030 MMt of GHG emissions annually. Consequently, the potential impacts of the Proposed would result in approximately .027 MMt of additional GHG emissions from the Proposed Action compared to the No Action Alternative.
	<i>Total by Alternative (=)</i>	There would be an estimated 0.62 percent increase in the total wells (39,500) included in the RMP air quality analysis and a 0.62 percent increase in High Plains District GHG emissions (7.9 MMt) from the combined total of new 243 wells within the area.	There would be an estimated 0.96 percent increase in the total wells (39,500) included in the RMP air quality analysis and a 0.96 percent increase in High Plains District GHG emissions (7.9 MMt) from the combined total of 378 new wells within the area.

Table 5-2. Cumulative Effects for the SFD CIA (Cont'd)

Resource	Cumulative Increment	NO ACTION ALTERNATIVE Combined total = 15 wells	PROPOSED ACTION Combined total = 40 well pads/ locations with 150 wells
Range Management	<i>(RFFA) (+)</i>	The 228 wells included in the RFFA would result in 1,494 acres (268 AUMs) of short-term disturbance and 832 acres of long-term disturbance (149 AUMs). This disturbance is associated with the pads only and does not include road or pipeline disturbance.	
	<i>Incremental Effect of Alternatives (+)</i>	This alternative would result in the loss of approximately 258 acres and the potential for approximately 46 AUMs. However only 54 percent of the acres that support the 579 AUMs of the two intersected allotments are located within the project boundary, which would amount to approximately 4 percent of AUMs prior to reclamation. Long-term loss of approximately 91 acres and the potential for 16 AUMs, would amount to approximately 1.5 percent of the total AUMs. Disturbance estimates include pads, roads, and pipelines.	This alternative would result in the loss of approximately 686 acres and the potential for approximately 123 AUMs. However only 54 percent of the acres that support the 579 AUMs of the two intersected allotments are located within the project boundary, which amount to approximately 11 percent of the AUMs prior to reclamation. Long-term reduction of approximately 242 acres and the potential for 43 AUMs, would amount to approximately 4 percent of the total AUMs in the project boundary throughout the life of the project. Disturbance estimates include pads, roads, and pipelines. Consequently, the potential long-term impacts of the Proposed Action would result in the loss of approximately 27 additional AUMs compared to the No Action Alternative.
	<i>Total by Alternative (=)</i>	Of the 3,732 AUMs within the CIA, there could be an estimated short-term reduction of 314 AUMs (6 percent) and a long-term reduction of 165 AUMs (4 percent).	Of the 3,732 AUMs within the CIA, there could be an estimated short-term reduction of 391 AUMs (10 percent) and a long-term reduction of 192 AUMs (5 percent).

Table 5-2. Cumulative Effects for the SFD CIA (Cont'd)

Resource	Cumulative Increment	NO ACTION ALTERNATIVE Combined total = 15 wells	PROPOSED ACTION Combined total = 40 well pads/ locations with 150 wells
<i>Soils and Ecological Sites</i>	<i>(RFFA) (+)</i>	The 228 wells included in the RFFA would result in 1,494 acres of short-term disturbance and 832 acres of long-term disturbance. This disturbance is associated with the pads only and does not include road or pipeline disturbance.	
	<i>Incremental Effect of Alternatives (+)</i>	<p>The short-term surface disturbance for construction, drilling, completion, and production of the 15 wells would yield an approximate total 258 acres of disturbance prior to reclamation. Disturbance estimates include pads, roads, and pipelines.</p> <p>The surface disturbance for the 15 wells, with consideration for reclamation, would yield a total of 91 acres of long-term disturbance over the life of the project. Disturbance estimates include pads, roads, and pipelines.</p>	<p>The short-term combined surface disturbance for construction, drilling, completion, and production of the 150 wells would yield a total of approximately 686 acres of disturbance prior to reclamation. Disturbance estimates include pads, roads, and pipelines.</p> <p>The surface disturbance for the 150 wells, with consideration for reclamation, would yield a total of approximately 242 acres of long-term disturbance over the life of the project. Disturbance estimates include pads, roads, and pipelines.</p> <p>Consequently, the potential long-term impacts of the Proposed Action would result in the disturbance of approximately 151 additional acres of soils compared to the No Action Alternative.</p>
	<i>Total by Alternative (=)</i>	Of the 385,900 acres within the CIA, there would be an estimated combined short-term surface disturbance of 1,752 acres (0.45 percent) and a long-term surface disturbance of 923 acres (0.24 percent).	Of the 385,900 acres within the CIA, there would be an estimated combined short-term surface disturbance of 2,180 acres (0.56 percent) and a long-term surface disturbance of 1,074 acres (0.28 percent).

Table 5-2. Cumulative Effects for the SFD CIA (Cont'd)

Resource	Cumulative Increment	NO ACTION ALTERNATIVE Combined total = 15 wells	PROPOSED ACTION Combined total = 40 well pads/ locations with 150 wells
Vegetation	<i>(RFFA) (+)</i>	The 228 wells included in the RFFA would result in 1,494 acres of short-term disturbance and 832 acres of long-term disturbance. This disturbance is associated with the pads only and does not include road or pipeline disturbance.	
	<i>Incremental Effect of Alternatives (+)</i>	<p>The short-term surface disturbance for construction, drilling, completion, and production of the 15 wells would yield an approximate total 258 acres of disturbance prior to reclamation. Disturbance estimates include pads, roads, and pipelines.</p> <p>The surface disturbance for the 15 wells, with consideration for reclamation, would yield a total of 91 acres of long-term disturbance over the life of the project. Disturbance estimates include pads, roads, and pipelines. Disturbance estimates include pads, roads, and pipelines.</p>	<p>The short-term combined surface disturbance for construction, drilling, completion, and production of the 150 wells would yield a total of approximately 686 acres of disturbance prior to reclamation. Disturbance estimates include pads, roads, and pipelines.</p> <p>The surface disturbance for the 150 wells, with consideration for reclamation, would yield a total of approximately 242 acres of long-term disturbance over the life of the project. Disturbance estimates include pads, roads, and pipelines.</p> <p>Consequently, the potential long-term impacts of the Proposed Action would result in the disturbance of approximately 151 additional acres of vegetation compared to the No Action Alternative.</p>
	<i>Total by Alternative (=)</i>	Of the 385,900 acres within the CIA, there would be an estimated combined short-term surface disturbance of 1,752 acres (0.45 percent) and a long-term surface disturbance of 923 acres (0.24 percent).	Of the 385,900 acres within the CIA, there would be an estimated combined short-term surface disturbance of 2,180 acres (0.56 percent) and a long-term surface disturbance of 1,074 acres (0.28 percent).

Table 5-2. Cumulative Effects for the SFD CIA (Cont'd)

Resource	Cumulative Increment	NO ACTION ALTERNATIVE Combined total = 15 wells	PROPOSED ACTION Combined total = 40 well pads/ locations with 150 wells
Invasive, Non-Native Plant Species	<i>(RFFA) (+)</i>	The 228 wells included in the RFFA would result in 1,494 acres of short-term disturbance and 832 acres of long-term disturbance. This disturbance is associated with the pads only and does not include road or pipeline disturbance.	
	<i>Incremental Effect of Alternatives (+)</i>	<p>Introduction of invasive, non-native plant species occurs with surface disturbance.</p> <p>The short-term surface disturbance for construction, drilling, completion, and production of the 15 wells would yield an approximate total 258 acres of disturbance prior to reclamation. Disturbance estimates include pads, roads, and pipelines.</p> <p>The surface disturbance for the 15 wells, with consideration for reclamation, would yield a total of 91 acres of long-term disturbance over the life of the project. Disturbance estimates include pads, roads, and pipelines.</p>	<p>Introduction of invasive, non-native plant species occurs with surface disturbance.</p> <p>The short-term combined surface disturbance for construction, drilling, completion, and production of the 150 wells would yield a total of approximately 686 acres of disturbance prior to reclamation. Disturbance estimates include pads, roads, and pipelines.</p> <p>The surface disturbance for the 150 wells, with consideration for reclamation, would yield a total of approximately 242 acres of long-term disturbance over the life of the project. Disturbance estimates include pads, roads, and pipelines.</p> <p>Consequently, the potential long-term impacts of the Proposed Action would result in the disturbance of approximately 151 additional acres compared to the No</p>
	<i>Total by Alternative (=)</i>	Of the 385,900 acres within the CIA, there would be an estimated combined short-term surface disturbance of 1,752 acres (0.45 percent) and a long-term surface disturbance of 923 acres (0.24 percent).	Of the 385,900 acres within the CIA, there would be an estimated combined short-term surface disturbance of 2,180 acres (0.56 percent) and a long-term surface disturbance of 1,074 acres (0.28 percent).

Table 5-2. Cumulative Effects for the SFD CIA (Cont'd)

Resource	Cumulative Increment	NO ACTION ALTERNATIVE Combined total = 15 wells	PROPOSED ACTION Combined total = 40 well pads/ locations with 150 wells
<i>Water Resources</i>	<i>(RFFA) (+)</i>	<p>The 228 wells included in the RFFA would use an estimated 12,631,200 bbls (1,628 ac-ft) of water. This water usage is comparable to 1.7 days of combined water uses throughout Converse County. Anticipated average annual water production is estimated to be 10,950 bbls per well). Based on the 228 wells that could be completed under the No Action Alternative, an estimated 2,496,600 bbls (321.8 ac-ft) of water could be produced each year.</p>	
	<i>Incremental Effect of Alternatives (+)</i>	<p>Impacts to groundwater occur through actual water usage and injection into the ground. This alternative would use an estimated 831,000 bbls (107 ac-ft) of water for 15 wells over the life of the project.</p> <p>This water usage is comparable to 0.1 day of combined water uses throughout Converse County.</p> <p>Produced water would be disposed of via subsurface injection, surface evaporative pits, or used for beneficial use (e.g., drilling operations). Anticipated average water production is estimated to be 30 bbls per day per well (annual production of 10,950 bbls per well). Based on the 15 wells that could be completed under the No Action Alternative, an estimated 164,250 bbls (21.2 ac-ft) of water could be produced each year.</p>	<p>Impacts to groundwater occur through actual water usage and injection into the ground. This alternative would use an estimated 8,310,000 bbls (1,071 ac-ft) of water for 150 wells over the life of the project for well completion and development. An additional 750,000 bbls (97 ac-ft) could be used for dust suppression over the life of the project.</p> <p>This water usage (1,168 ac-ft) is comparable to 1.2 days of combined water uses throughout Converse County.</p> <p>Produced water would be disposed of via subsurface injection, surface evaporative pits, or used for beneficial use (e.g., drilling operations). Anticipated average water production is estimated to be 30 bbls per day per well (annual production of 10,950 bbls per well). Based on the 150 wells that could be completed under the Proposed Action, an estimated 1,642,500 bbls (212 ac-ft) of water could be produced each year.</p>
	<i>Total by Alternative (=)</i>	<p>An estimated 13,462,200 barrels (1,735.3 ac-ft) of water would be used long-term for 243 wells. Usage is comparable to 1.9 days of Converse County combined water uses.</p> <p>Anticipated average annual water production from the combined 243 wells is estimated at 2,660,850 bbls (343.0 ac-ft) of water could be produced each year.</p>	

Table 5-2. Cumulative Effects for the SFD CIA (Cont'd)

Resource	Cumulative Increment	NO ACTION ALTERNATIVE Combined total = 15 wells	PROPOSED ACTION Combined total = 40 well pads/ locations with 150 wells
Wildlife, Special Status Species (SSS), and Threatened and Endangered Species (T&E)	<i>(RFFA) (+)</i>	The 228 wells included in the RFFA would result in 1,494 acres of short-term disturbance and 832 acres of long-term disturbance to wildlife habitat. This disturbance is associated with the pads only and does not include road or pipeline disturbance.	
	<i>Incremental Effect of Alternatives (+)</i>	The short-term surface disturbance for construction, drilling, completion, and production of the 15 wells would yield an approximate total 258 acres of disturbance prior to reclamation. The surface disturbance for the 15 wells, with consideration for reclamation, would yield a total of 91 acres of long-term disturbance over the life of the project. Disturbance estimates include pads, roads, and pipelines.	The short-term combined surface disturbance for construction, drilling, completion, and production of the 150 wells would yield a total of approximately 686 acres of disturbance prior to reclamation. The surface disturbance for the 150 wells, with consideration for reclamation, would yield a total of approximately 242 acres of long-term disturbance over the life of the project. Disturbance estimates include pads, roads, and pipelines. Consequently, the potential long-term impacts of the Proposed Action would result in the disturbance of approximately 151 additional acres of wildlife habitat compared to the No Action Alternative.
	<i>Total by Alternative (=)</i>	Of the 385,900 acres within the CIA, there would be an estimated combined short-term disturbance to wildlife habitat of 1,752 acres (0.45 percent) and a long-term disturbance of 923 acres (0.24 percent).	Of the 385,900 acres within the CIA, there would be an estimated combined short-term disturbance to wildlife habitat of 2,180 acres (0.56 percent) and a long-term disturbance of 1,074 acres (0.28 percent).

WDEQ/AQD 2010). The additional air quality related emissions (primarily NO_x, CO, SO₂ and O₃) originating from the additional wells and associated gas powered production equipment are not substantially different than air quality impacts from current oil and gas production. If mitigation measures specified in the NEPA analyses for the projects within the CIA are implemented, the cumulative air quality impacts from the Proposed Action would not result in violations of air quality standards.

Based on the greenhouse gas emission factors discussed in Section 4.2.1.2, the Proposed Action and other new development within the CIA could result in additional GHG emissions of approximately 0.076 MMt of CO₂e annually (378 additional wells [SFD – 150 wells, leases not held by production within the CIA – 80, and added by Highland Loop EA – 148] at 0.0002 MMt CO₂e/well). This represents a 0.96 percent increase over the estimated 2010 annual CO₂e emission for the High Plains District (7.9 MMt as derived from 39,500 wells X 0.0002 MMt CO₂e/well).

5.2.2 No Action Alternative

The CIA No Action Alternative would respond to individual APDs on a case-by-case basis, and potentially 15 new well locations could be processed. Based on the greenhouse gas emission factors discussed in Section 4.2.1.2, the CIA No Action Alternative could result in additional GHG emissions of approximately 0.003 MMt of CO₂e annually (15 wells X 0.0002 MMt CO₂e/well). This represents a 0.04 percent increase over the estimated 2010 annual CO₂e emission for the High Plains District (7.9 MMt as derived from 39,500 wells X 0.0002 MMt CO₂e/well).

5.3 Range Management

5.3.1 Proposed Action

The Highland Loop Road EA (WY-060-EA12_226) page 99, calculated approximately 3,732 animal unit months (AUMs) within the Highland Loop project area. The SFD would increase the current areas approved for oil and gas disturbance in the CIA by approximately 686 acres of short-term and approximately 242 acres long-term (Table 5-1). The RFFA and the proposed SFD combined would be a loss of approximately 2,180 acres of vegetation which would result in a short-term reduction of approximately 391 AUMs. The short-term reduction represents approximately 10 percent of the total AUMs within the CIA.

Interim reclamation would reduce the initial SFD project disturbance to 242 acres of long-term disturbance until final reclamation is conducted. The RFFA and the proposed SFD combined would be a loss of approximately 1,074 acres of long-term surface disturbance. The total long-term loss of approximately 1,074 acres of vegetation would result in a reduction of approximately 192 AUMs. This long-term reduction represents approximately 5 percent of the total AUMs within the CIA.

The long-term cumulative loss would total 1,074 acres of vegetative cover, forage, and browse. The relatively slight increase in loss of forage and vegetative productivity would not represent a substantial cumulative impact.

The disturbance of existing, native vegetation would create opportunities for the establishment of invasive, non-native (noxious) species. Invasive species are easily established and commonly found on all newly disturbed and reclaimed sites throughout Wyoming. These species are fast growing, can out-compete native species, can increase the danger of wildfires, and can prevent the establishment of native species including grasses, forbs and, and shrubs. Any area(s) within the CIA subjected to new surface disturbance would represent an opportunity for the establishment of these invasive, non-native species. However, assuming that invasive, non-native plant species would be controlled by SRC within the SFD project area, it is unlikely that the Proposed Action would add to adverse cumulative impacts on native plant communities arising from the invasion of and replacement with non-native species.

5.3.2 No Action Alternative

Under the CIA No Action Alternative, the initial loss of approximately 1,752 acres of vegetation would result in a short-term reduction of approximately 314 AUMs. The short-term reduction represents approximately 0.45 percent of the total AUMs within the CIA.

It is anticipated that approximately 829 acres will be reclaimed following reclamation. This will result in a long term disturbance of 923 acres. Following reclamation approximately 165 AUMs will be impacted long term which represents 0.24 percent of total AUMs within the project area.

5.4 Soils

5.4.1 Proposed Action

The SFD would increase the current areas approved for oil and gas disturbance (1,494 acres) in the CIA by approximately 686 acres (Table 5-1). The successful reclamation of the short-term disturbance associated with the SFD project and other projects within the CIA would reduce the long-term cumulative disturbance total within the CIA to approximately 1,074 acres. Ultimately, some minor amount of soil would be expected to move off of disturbed areas within the project area due to wind and water erosion. Implementation of BMPs for reclamation and erosion control would result in a commensurate reduction in overall erosion rates as discussed in Section 4.5.1.

Cumulative impacts related to the Proposed Action to soils would be reduced based on the use of BMPs within the overall CIA. Combined with routine monitoring of reclamation success and implementation of remedial measures as necessary to correct

any identified deficiencies, the cumulative impacts to the soil resource would not be significantly greater than the CIA No Action Alternative.

5.4.2 No Action Alternative

The CIA No Action Alternative would result in an estimated disturbance of approximately 1,752 acres of soils associated with the 243 wells currently approved but not drilled in the CIA. Interim reclamation would reduce the long-term disturbance associated with the CIA No Action Alternative to approximately 923 acres.

Disturbance associated with the CIA No Action Alternative could lead to increased surface runoff and water erosion, degradation of soil structure during the handling of suitable topsoil during the stripping process, soil compaction, and soil contamination. Leaks and spills of petroleum products, drilling muds, pipeline ruptures, and other contaminants from production and storage facilities could occur and potentially affect soil quality at the location of the spill or be transported via surface runoff to nearby soil resources down gradient from the CIA. Implementation of BMPs for reclamation and erosion control would result in a commensurate reduction in impacts to soils.

5.5 Water Resources

5.5.1 Proposed Action

A drainage system classification reflects the surface expression of topography and is more useful when describing surface-water resources, whereas ground-water resources are best described using aquifer discussions. The cumulative surface water impacts analysis area includes the 646,400 acre Lightning Creek drainage basin. The cumulative groundwater impact analysis area includes Converse County.

The primary cumulative impacts to surface-water resources would be sediment loading caused by surface disturbance related to project development/maintenance and impacts brought about by contamination of surface water from the accidental discharge (spill) of HF fluids, drilling fluids, and produced water. Surface disturbing activities associated with the CIA would increase the cumulative initial surface disturbance in the 646,400 acre Lightning Creek watershed by approximately 2,180 acres. The 2,180-acre increase in disturbance represents 0.34 percent of the watershed and would be considered a negligible increase in the amount of disturbance upon the affected watershed. The potential for surface spills of fuels or other contaminants that could cumulatively impact surface water quality would be minimized through the implementation of BMPs, SPCC plans, and compliance with other state and federal regulations. The additional oil/gas exploration and development activity within the watershed evaluated in this EA would result in negligible cumulative impacts to surface waters and the watershed.

Groundwater within the CIA could be affected by contamination (degradation) during construction of wells and from other subsurface project-development activities and

from water removed for dust suppression and during production. The greatest potential for degradation of the shallow Wasatch and Fort Union aquifers that supply shallow wells would be contamination resulting from activities within the CIA. The most probable pathway for groundwater contamination would be undetected spills and leachate from leaking produced-water facilities or mud pits. Additionally, undetected defects in either casing installation or cementing would be the most probable scenario for groundwater contamination to occur from oil well drilling and completion activities. Leakage from freshwater 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. 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 cumulative adverse effects on groundwater quality.

Cumulative groundwater impacts could also result from groundwater removal for supply of water used during drilling and completion activities and dust suppression and from production related activities (produced water), which would remove water from the formations targeted for oil and gas production. Up to 378 new oil and gas wells (added by Highland Loop EA – 148 and added by Scott Field – 150) could be completed within the CIA. Using the estimates of water required for the various phases of well drilling and completion included in this EA (55,400 bbls/well), the maximum annual water requirements would be approximately 20,941,200 bbls (2,699 ac-ft). The total water use for the CIA is comparable to 3.5 days of groundwater use within Converse County (at historic use rates) over the estimated 5 to 10 years to complete the drilling.

Produced water from conventional natural gas production is estimated to be 30 bbls per day per well (annual production of 10,950 bbls per well). The amount of water produced annually from conventional natural gas production is estimated to be 4,139,100 bbls (533.5 ac-ft). The water removed as a result of production operations would be from formations at depths of between 9,500 and 13,000 and would not be suitable for most beneficial uses.

Because oil and gas wells would be completed at considerable depths (9,500 to 13,000 feet below ground surface), groundwater resources near the surface, such as springs, shallow alluvium, and domestic wells would not be affected by drilling and completion activities. Water use could impact these aquifers, depending on the aquifer targeted for groundwater removal. Water used for project-development activities and for dust suppression would be acquired from already appropriated sources or new wells, all of which would include valid groundwater rights issued by the WSEO.

5.5.2 No Action Alternative

Up to 243 new oil and gas wells could be completed within the CIA under the No Action Alternative resulting in an estimated disturbance of approximately 1,752 acres. Interim reclamation would reduce the long-term disturbance associated with the CIA No Action Alternative to approximately 923 acres.

Surface disturbing activities associated with the CIA No Action Alternative would increase the cumulative initial surface disturbance in the 646,400 acre Lightning Creek watershed by approximately 1,752 acres. The 1,752-acre increase in disturbance represents 0.27 percent of the watershed and would be considered a negligible increase in the amount of disturbance upon the affected watershed. The potential for surface spills of fuels or other contaminants that could cumulatively impact surface water quality would be minimized through the implementation of BMPs, SPCC plans, and compliance with other state and federal regulations. As a result of the decreased amount of surface disturbance, the additional oil/gas exploration and development activity within the watershed associated with the CIA No Action Alternative would be slightly less than the Proposed Action.

The types of cumulative groundwater effects under the CIA No Action Alternative would be similar to those described under the Proposed Action and would include contamination (degradation) during construction of wells and from other subsurface project-development activities and from water removed for dust suppression and during production. Cumulative groundwater impacts could also result from groundwater removal for supply of water used during drilling and completion activities and dust suppression and from production related activities (produced water), which would remove water from the formations targeted for oil and gas production. Up to 15 new oil and gas wells could be completed within the CIA under the No Action Alternative. Using the estimates of water required for the various phases of well drilling and completion included in this EA (55,400 bbls/well), the maximum annual water requirements would be approximately 17,229,400 bbls (2,221 ac-ft). The total water use for the CIA is comparable to 2.4 days of groundwater use within Converse County (at historic use rates) over the estimated 5 to 10 years to complete the drilling.

Produced water from conventional natural gas production is estimated to be 30 bbls per day per well (annual production of 10,950 bbls per well). The water removed as a result of production operations would be from formations at depths of between 9,500 and 13,000 and would not be suitable for most beneficial uses.

Because oil and gas wells would be completed at considerable depths (9,500 to 13,000 feet below ground surface), groundwater resources near the surface, such as springs, shallow alluvium, and domestic wells would not be affected by drilling and completion activities. Water use could impact these aquifers, depending on the aquifer targeted for groundwater removal. Water used for project-development activities and for dust suppression would be acquired from already appropriated sources or new wells, all of which would include valid groundwater rights issued by the WSEO.

As a result of the decreased number of wells associated with the CIA No Action Alternative, the impacts from oil/gas exploration and development activity to groundwater resources would be less than the Proposed Action.

6.0 CONSULTATION AND COORDINATION

6.1 Background

The Scott Field Development EA was prepared by WWC Engineering (WWC), a third party contractor, under the direction of the BLM. A list of the personnel responsible for document preparation and their individual responsibilities are provided below.

6.2 Contributors, Reviewers, and Preparers

Table 6-1 identifies the federal personnel associated with the review of this EA. Table 6-2 identifies those personnel responsible for the preparation of the environmental assessment document.

Table 6-1. Federal Interdisciplinary Team

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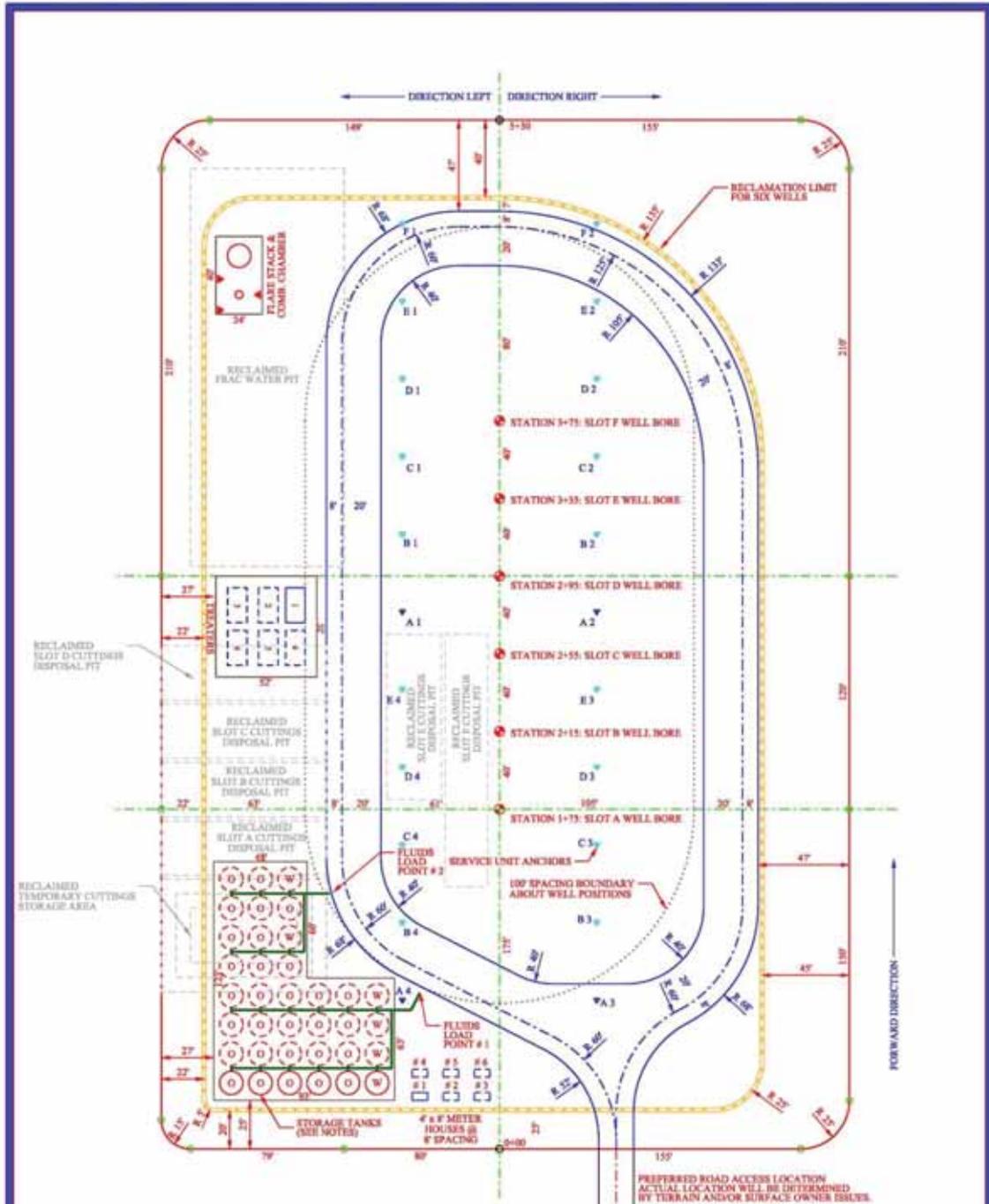
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APPENDIX A

Typical Well Pad Layout

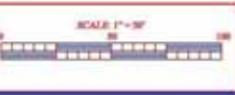


- NOTES:**
1. The drawing shows the proposed location of production equipment and the proposed fluids haul loop route.
 2. The storage tanks are 12' diameter by 29' height with a capacity of 400 bbls. The estimated storage volume required per well is 2000 bbl of oil and 400 bbl of water. The spacing between tanks is 3 feet.
 3. The storage tanks and trailers will usually be placed near the positions shown. An earthen berm or steel spill barrier will be erected on the perimeter of the tanks, flare stack and trailers. Dependent upon the access road location, it may be necessary to locate the flare stack and ember house in different positions. In any case, the minimum safety spacing will be observed. The minimum spacing utilized is 100 feet between wells and tanks and trailers. The minimum spacing of 125 feet between a flare and wells and tanks and trailers.
 4. The position of the well service anchors is the four points at 100 feet forward and 100 feet back of the well bore and 50 feet left and 50 feet right of the well bore.
 5. The interim reclamation limit is estimated to lie outside the anchors and production equipment as shown.
 6. The area of the pad within the pad perimeter is 4.30 acres prior to interim reclamation. The area of the pad within the proposed interim reclamation boundary for the six wells is 0.00 acres. Thus approximately 70.5% of the area of original pad will be used for production operations.

PRODUCED FLUIDS HAUL LOOP ROUTE NOTE:

1. The haul route center line is proposed as shown. The shoulders of the route are shown to illustrate the validity of this route. The nominal width is 16', with 8' on each side of center line. Curve widening on the inside of curves is shown where the widening is 12' for a radius of 60'. Although a curve widening of 4' for a radius of 125' is sufficient, a value of 12' is used to simplify construction. This configuration will support a tractor-trailer-pup combination hauling unit. The entry point to the haul loop would be determined by the actual entry point of the road. The radius of the approach to the haul loop should be a minimum of 50 feet as shown in this example.

DATE	BY	CHKD	APP'D
08/11/11	JAG	JAG	JAG
P.J. GROSCH CONSTRUCTION, INC. SURVEYORS - ENGINEERS - CONSTRUCTORS			



SAMSON RESOURCES COMPANY
DENVER, COLORADO

TYPICAL WELL SITE FOR PRODUCTION ACTIVITIES
6 WELLS - 48' SPACING - 400 BBL TANKS
HORNBUCKLE FIELD
CONVERSE COUNTY, WYOMING

EX. HB-6-40-400-081512
TYPICAL PRODUCTION FACILITY LAYOUT

APPENDIX B

Scott Field Federal Oil and Gas Lessees of Record

Location	Parcel/Lot	Lease Number	Lessees of Record
T35N R71W			
Section 03	S2NW, Lot 3,4	WYW 033310	Bill Barrett Corporation Club O&G Ltd JWD III Inc. Raymond T. Duncan Trust Walter Duncan Oil
Section 26 Section 27	W2 S2	WYW 033781	Club O&G Ltd JWD III Inc. Raymond T. Duncan Trust Oil Prop Ltd Samson Resources Company Vincent Duncan Trust Walter Duncan Oil
Section 05 Section 08 Section 20	S2N2,S2, Lot 1,2,3,4 W2 NE,E2NW	WYW 044175	Black Bear Oil Corporation CIM Energy Properties LLC Hyperion Oil & Gas LLC Maxus Energy Corporation SM Energy Company
Section 13 Section 14 Section 15 Section 25	SE S2S2,NESE N2NW,SWNW,NW,N2SW, SWSW, SESE NE	WYW 050677	Energen Resources Corporation Hilcorp Energy X LP
Section 21	W2SE	WYW 056933	Hyperion Oil & Gas LLC
Section 03 Section 09 Section 10	S2NE, Lot 1,2 NE W2	WYW 059952	Hyperion Oil & Gas LLC
Section 12 Section 13	N2,SW,N2SE S2N2,SW	WYW 060401	Chesapeake Exploration LLC Four-Ten Exploration Noll Daurine
Section 04	SW	WYW 060402	GWR Operating Company Hyperion Oil & Gas LLC
Section 17 Section 21	NESW, N2SE, SESE NW,NESW	WYW 062625	Derby Energy LLC Hyperion Oil & Gas LLC Kaiser-Francis Oil
Section 02 Section 04 Section 11 Section 12 Section 22 Section 23	S2NE,SE, Lot 1,2 S2NW, Lot 3,4 S2 SWSE E2 E2	WYW 063034	Black Bear Oil Corporation
Section 31 Section 33 Section 34	NENE,S2NE E2 ALL	WYW 138407	Hyperion Oil & Gas LLC
Section 07 Section 17 Section 18 Section 29 Section 31 Section 32 Section 33	NENW SWNW,NWSW SENE,NESE E2 NWNE,E2W2,SE, Lot 1,2,3,4 W2 SWSW	WYW 176184	Chesapeake Exploration LLC Khody Land & Minerals Company OOGC America Inc. Red Technology Alliance LLC

Location	Parcel/Lot	Lease Number	Lessees of Record
T35N R72W			
Section 01	NENE	WYW 051172	Robert L. Haynie Revoc Trust
Section 01	NWSE	WYW 055819	Hyperion Oil & Gas LLC
Section 01	Lot 3	WYW 062625	Derby Energy LLC Hyperion Oil & Gas LLC Kaiser-Francis Oil
Section 01 Section 10	S3NW,N2SW, Lot 4 SW	WYW 106213	Black Bear Oil Corporation
Section 01	SWSW	WYW 107266	Black Hills Exploration & Production Inc.
Section 12	NENE,S2NE,W2SE	WYW 176522	Chesapeake Exploration LLC Khody Land & Minerals Company OOGC America Inc.

Location	Parcel/Lot	Lease Number	Lessees of Record
T36N R71W			
Section 01	Lot 3,4	WYW 060403	Black Bear Oil Corporation Maxus Energy Corporation Samson Resources Company
Section 03	Lot 2,3,4		
Section 08	NW		
Section 15	NE		
Section 27	ALL		
Section 29	SW		
Section 04	Lot 4	WYW 066006	Journey Properties LLC Kennedy M. John Louisiana Land & Exploration
Section 18	E2SW, Lot 3,4		
Section 15	NWSE	WYW 067031	Hyperion Oil & Gas LLC Kennedy Oil Louisiana Land & Exploration Ram Energy Inc.
Section 19	E2SW		
Section 21	N2NW, SWNW		
Section 24	E2SW		
Section 26	SW		
Section 06	NESE, Lot 1,5,7	WYW 067675	Hyperion Oil & Gas LLC Louisiana Land & Exploration Petrohawk Properties LP Providence Energy Corporation Samson Resources Company Wellstar Corporation Wildcard O&G Company
Section 07	NESW		
Section 10	NENE,SWNW,SWSW,NESE		
Section 20	NENE, SWSE		
Section 29	NWNW		
Section 31	NENE,SENW, Lot 4		
Section 02	SW	WYW 176185	Hyperion Oil & Gas LLC
Section 03	SW		
Section 04	SWNW		
Section 05	SW		
Section 10	N2SW		
Section 25	SE		
Section 04	SENW, Lot 3	WYW 176186	Chesapeake Exploration LLC Khody Land & Minerals Company OOGC America Inc.
Section 05	S2N2, Lot 1,2,3,4		
Section 09	NW		
Section 25	N2,SW		
Section 26	N2,SE		
Section 35	E2		
Section 03	SE	WYW 177343	Chesapeake Exploration LLC Khody Land & Minerals Company OOGC America Inc.
Section 10	W2NE,SENE,N2NW,SENW		
Section 11	N2		
Section 07	SESW, Lot 3,4	WYW 177690	Samson Resources Company
Section 22	SE	WYW 050676	Angel LLC Chevron USA Inc. CN Energy LLC Davis Charles B. Fuel Exploration Greenbriar Energy LP IV MHBR Energy LLC Samson Resources Company SM Energy Company Swanson Energy Company LLC

Location	Parcel/Lot	Lease Number	Lessees of Record
T36N R71W			
Section 20 Section 29 Section 30 Section 31	W2NE, SENE, N2SE NENE,NENW N2NE, Lot 4 W2NE,NENW,E2SW, Lot 1,2,3,4	WYW 020264	AnaDarko Petroleum Corporation Citation Oil and Gas Corporation Encana O&G (USA) Inc. Hyperion Oil & Gas LLC Nortex Corporation Samson Resources Company
Section 33 Section 34	E2,SENW,E2SW W2	WYW 031318	Club O&G Ltd. JWD III Inc. Plaza Resources Company PO&G Resources Texas LLC Raymond T. Duncan Oil Prop Ltd. Stone Energy Corporation Vincent Duncan Trust Walter Duncan Oil
Section 02 Section 03 Section 09 Section 12 Section 15	S2NW, Lot 1,2,3,4 S2N2, Lot 1 SW NW SW	WYW 033782	Captiva Resources Inc. Cordell James C. Derby Energy LLC Hyperion Oil & Gas LLC Prima Exploration Inc. True Oil LLC Vegas Production Company
Section 07 Section 08 Section 17 Section 18	NE, E2NW, Lot 1,2 S2 SE E2NW, Lot 1,2	WYW 033783	HilCorp Energy X LP
Section30	SESW	WYW 033784	Toc-Rocky Mountains Inc.
Section 04 Section 06 Section 06	S2 S2NE,SENW,E2SW, W2SE, SESE	WYW 033785	HilCorp Energy X LP
Section 01 Section 02 Section 12 Section 13 Section 14 Section 15 Section 21 Section 22 Section 23 Section 24 Section 28	S2NW,SW S2NE N2NE,SW SESE N2,SW,W2SE,NESE N2NW,SWNW,S2SE,NESE S2SE,SESW N2NE S2,N2NW,E2NE W2SW E2E2	WYW 050674	BP America Production Company Chase Oil Corporation Hyperion Oil & Gas LLC. Resource Dev. Technology LLC
Section 02 Section 22 Section 24 Section 30	SE SW SE SE	WYW 056242	Hyperion Oil & Gas LLC
Section 32	SW	WYW 057333	Hyperion Oil & Gas LLC
Section 32 Section 33	NE NENW, W2W2	WYW 060402	GWR Operating Company Hyperion Oil & Gas LLC

Location	Parcel/Lot	Lease Number	Lessees of Record			
T36N R72W						
Section 11	NWSW	WYW 005932	Great Western Drilling Ltd Pathfinder Energy Wellstar Corporation			
Section 12	NE					
Section 13	SE					
Section 14	NENW					
Section 15	SWSW					
Section 22	N2SW, SESW					
Section 23	SE					
Section 26	N2NE					
Section 24	SW	WYW 031766	Tenneco Oil Company			
Section 25	N2NW	WYW 036186	Toc-Rocky Mountains Inc.			
Section 25	SE					
Section 24	W2SE	WYW 108281	Hyperion Oil & Gas LLC			
Section 25	N2NE	WYW 108465	Black Hills Exploration & Production Inc.			
Section 24	SESE					
Section 01	SWSE, N2SE	WYW 162614	Chesapeake Exploration LLC Khody Land & Minerals Company OOGC America Inc.			
Section 01	S2N2, Lots 1,2,3,4 S2N2,S2 S2NE,SENW,N2SE,SESE, Lots 1,2,3,4 W2NW E2SW SE NE,N2NW,SWNW,N2SW SENE,E2SW,SE	WYW 174493	Samson Resources Company			
Section 02						
Section 03						
Section 10						
Section 11						
Section 12						
Section 14						
Section 15						
Section 13				SW	WYW 175052	Chesapeake Exploration LLC Khody Land & Minerals Company OOGC America Inc.
Section 22				NW,SE		
Section 27	N2,N2SW,SWSW					
Section 34	S2SW					
Section 24	SWNW	WYW 181532	Chesapeake Exploration LLC Khody Land & Minerals Company OOGC America Inc.			
Section 23	NENE,NENW,S2N2,SW NE,N2NW,SENW	WYW 181533	Chesapeake Exploration LLC Khody Land & Minerals Company OOGC America Inc.			
Section 24						

Location	Parcel/Lot	Lease Number	Lessees of Record		
T36N R72W					
Section 01	SW,SESE	WYW 178399	Chesapeake Exploration LLC Khody Land & Minerals Company OOGC America Inc.		
Section 02	Lots 1,2,3,4				
Section 03	SWSW				
Section 04	SENW				
Section 07	W2SE				
Section 11	N2				
Section 18	Part of MS673 within NWSW Lot 3				
Section 20	NENW,S2NW,W2SW,SESW, S2NW,W2SW,SESW, Part of MS673 within NENW				
Section 21	S2,S2SW, Part of MS662 within NWSW				
Section 22	W2NE,SENE				
Section 28	N2, Part of MS662 within W2NE,SENE,NW				
Section 25	SWNW			WYW 063530	Toc-Rocky Mountains Inc.

Note: From BLM OG Plats (08/23/2010, 01/26/2012, and 07/09/2012) (BLM 2012e). The oil and gas rights for the above locations are owned by the federal government. For the remainder of the SFD project area, the oil and gas rights are state or privately owned.

APPENDIX C

Public Comments and Responses

Appendix C

Samson Resources Company Scott Field Development Project EA Comments and Responses

#	Commenter	Comment #	Comment	Response
1	Boner Bros. Partnership	1	<p>We are pleased that Samson Resources Co. (SRC) has undertaken the expense and work to prepare this EA. We have a very good relationship with SRC and are appreciative that SRC is the company that is planning on developing the oil and gas resources in the Scott Field. SRC has been very open in their communication and planning with us and responsive to our thoughts and inputs. We look forward to working together with Samson as their development plans unfold.</p> <p>Unfortunately, there are no assurances that SRC, or their current personnel, will be the company or people that see this develop to maturity. Companies sell assets, or the entire company, and individual personnel move on to different opportunities. It is in light of these facts that, despite our current very favorable relationship with SRC, we felt in necessary to comment on some potential issues regard Scott Field development. Our thoughts are that these issues do not need to be addressed in the EA, but would be better suited to be addressed in the APD process. However, we do not want to add a longer review time to the APD process and believe these issues could be simply addressed in a quick review of our Surface Use Agreement (SUA) with the company developing the resources.</p>	<p>The BLM is pleased to hear that Boner Bros. Partnership has a good relationship with Samson Resources Company. However, the BLM has no control over whether an operator sells their assets, sells their entire company, or what personal or contractors they chose to hire or relief of duty.</p> <p>The BLM does not review the Surface Use Agreements (SUA) between the operator and private surface owner. The SUA is a contract between the two parties and the BLM does not have any authority to include or exclude any content from a SUA. The BLM only requires, per Onshore Order # 1, that the operator must certify in their APD that an agreement with the surface owner has been reached or that a good faith effort to reach an agreement has failed. If no agreement has been reached with the surface owner, the operator must submit an adequate bond to the BLM for the benefit of the surface owner.</p>

2	Boner Bros. Partnership	2	<p><u>Lambing season.</u> A critical time for our sheep operation. Our current SUAs have stipulations regarding restricted activities during this time, roughly May 5th to June 25th, in those pastures in which we are lambing. SRC has been very responsive to our lambing restrictions. We simply would like to raise the issue to ensure the current cooperation continues in the event that the operator changes.</p>	<p>All future operators in the area will be required to make a good faith effort to reach a SUA with the private surface owner. It will be the responsibility of the private surface owner to include stipulations for restricted activities during lambing season.</p>
3	Boner Bros. Partnership	3	<p><u>Dust abatement and road impacts.</u> Constructing facilities, drilling and completing these wells greatly increases the activity level on the roads. Very well construction, safe roads are a necessity for development of this degree. One of our greatest impacts is dust generated from the roads and traffic. Other Operators have chosen to use a limestone product on their roads and the dust generated from those roads is beyond belief. Samson is doing a good job on their roads in their choice of processed river gravel and current dust abatement program. Once again, we raise this point only to make sure the current level of cooperation continues.</p> <p>We would also like to comment that BLM should start considering road surfacing materials for all operators in Converse County. The dust generated by the limestone surfacing material can, at times, be dangerous to both livestock and traffic on the roads. We have had a much better experience with the processed river gravel. Active dust abatement programs, such as water or magnesium chloride application, should be required when conditions and activity levels warrant.</p>	<p>During the onsite and through the entire APD process the BLM will and does coordinate with both the operator and the private surface owner. If a particular type of road surfacing material is desired on private surface the BLM encourages the private surface owner to attend the onsite and make their concerns known. The BLM can require certain road surfacing materials in the approved APD at the private surface owners request. The BLM will also include Conditions of Approval (COAs) in the approved APD for dust abatement practices for roadways.</p>
4	Boner Bros. Partnership	4	<p><u>Oil Based Mud cuttings.</u> Current WOGCC regulations allow for the testing, solidifying and burial of the OBMs on the drill location. Some Operators chose to dispose of the OBMs rather than bury them. Boner Bros. much prefers that Operators dispose of the OBM rather than bury them. We have started this discussion with SRC and they are looking for options other than their current method of solidifying and burial. We would like SRC to find an alternative solution as quickly as possible.</p>	<p>Per WOGCC and BLM regulations, Oil Based Muds (OBM) cuttings can be buried onsite if tested and solidified properly. If the private surface owner does not wish to have OBM cuttings buried on their private surface, then the private surface owner needs to include this restriction in the SUA between the operator and themselves.</p>

5	Boner Bros. Partnership	5	Finally, we are impressed with the manner in which SRC conducts their business and the relationships they build with landowners. We feel fortunate to have Samson as the company developing the resources on our ranch lands.	The BLM is pleased to hear that Boner Bros. Partnership has a good relationship with Samson Resources Company.
6	Wyoming Game and Fish Department (WGFD)	1	Due to the increasing intensity of oil and gas development in this area, the WGFD has concerns about cumulative effects of development on wildlife. We recommend continued annual wildlife surveys to determine the cumulative impacts of all activities on wildlife, especially sensitive species, endangered species, and wildlife on crucial winter range. Annual surveys and adjustments to development are recommended for the following species: Sage-grouse, Burrowing owl, Ferruginous hawk, Long-billed curlew, Mountain plover, Swift fox,	Samson Resources Company (SRC) has hired a third party wildlife consultant to conduct wildlife and plant surveys. These wildlife and plant surveys are conducted on yearly basis according the species being surveyed. On a yearly basis the consultant provides a comprehensive wildlife and plant survey report to SRC and the BLM. The BLM uses the finding from these surveys to apply appropriate wildlife and plant COAs to the approved APDs and to plan development.
7	WGFD	2	Listed below are the recommended dates that raptor nest sites should be free of disturbance. A 0.5mi buffer around each nest should be maintained. Exceptions may be granted based on topography or other site specific factors: Northern harrier, April 1-July 31; Swainsons hawk, May 1-August 31; Red-tailed hawk, March 15-July 31; Ferruginous hawk, April 1-July 31; Golden eagle, February 1-July 31; American kestrel, April 1-August 15; Merlin, April 1-August 15; Prairie falcon, March 1-August 15.	According to the <i>Record of Decision and Approved Casper Resource Management Plan</i> the BLM Casper Field Office uses the following raptor nesting stipulation: Avoid surface disturbance or occupancy within a 1/2 mile buffer of raptor nests, except for the following species, for which a 1/4 mile buffer will be required: Red-tailed hawk, Swainsons hawk, American kestrel, Osprey, Great-horned owl, Long-eared owl, Northern saw-whet owl, Common barn owl, Western screech owl. The seasonal restriction will be from February 1 to July 31, or until young birds have fledged.
8	WGFD	3	Additionally, we recommend a winter Bald eagle survey be conducted to document roost locations.	Samson Resources Company (SRC) has hired a third party wildlife consultant to conduct wildlife and plant surveys. These wildlife and plant surveys are conducted on yearly basis according the species being surveyed. On a yearly basis the consultant provides a comprehensive wildlife and plant survey report to SRC and the BLM. The BLM uses the finding from these surveys to apply appropriate wildlife and plant COAs to the approved APDs and to plan development.

9	WGFD	4	<p>With regard to surface disturbance, the WGFD recommends removal of vegetation only where necessary to minimize habitat loss. All topsoil should be appropriately stock-piled and later spread over disturbed areas in accordance with approved DEQ reclamation practices. Seed mixes should include a variety of forbs, grasses and shrubs suitable to the site which provide forage and cover value for wildlife. The WGFD recommends the project proponent aggressively treat invasive vegetative species resulting from surface disturbing activities along access roads and well pads. We recommend the use of appropriate herbicide and other control measures along all disturbed areas to minimize cheatgrass invasion on both public and private lands. For technical assistance, please contact the WGFD Casper Regional Office.</p>	<p>The BLM requires all operators to segregate the topsoil and subsoil piles for reclamation purposes. This is a standard practice in all oil and gas surface disturbance activities. The BLM also requires operators to treat invasive species on all disturbed areas. For interim and final reclamation the BLM defers to the private surface owner for the seed mix. If the surface owner defers the seed mix selection back to the BLM or the surface disturbance is located on BLM surface, the BLM will provide an appropriate seed mix based on the ecological site description and the current conditions on the ground.</p>
10	WGFD	5	<p>Where development entails a large work force, construction workers we recommend considering busing of workers to work locations to reduce traffic. Also, the project proponent should discourage "squatting" (tent and trailer camping) on public lands through the construction period. Project managers and contractors are highly encouraged to include information and training for employees regarding the requirements for purchase of hunting and fishing licenses, as well as education regarding basic wildlife laws such as trespass to hunt and fish and shooting from roads. Guns should be strictly prohibited on any job site and guns at construction camps should be signed-in and kept in gun lockers. We recommend mandatory reprimand or dismissal for employees convicted of poaching or harassing wildlife while employed by the company or on company property.</p>	<p>This is outside the scope of authority of the BLM.</p>
11	WGFD	6	<p>Accepted best management practices should be implemented to ensure that all sediments and other pollutants are contained within the boundaries of the work area. Disturbed areas that are contributing sediment to surface waters as a result of project activities should be promptly re-vegetated to maintain water quality.</p>	<p>The BLM requires all operators to control erosion and sediment movement off site from the area of surface disturbance. This is a standard COA that is included in every APD.</p>

12	WGFD	7	<p>Preventing the spread of aquatic invasive species (AIS) is a priority for the State of Wyoming, and in many cases, the intentional or unintentional spread of organisms from one body of water to another would be considered a violation of State statute and Wyoming Game and Fish Commission Regulation.</p>	<p>All operators are required to follow state laws and regulations.</p>
13	Wyoming Department of Agriculture (WDA)	1	<p>This project will impact grazing lessees, agriculture producers, landowners, and other citizens, as well as our natural resources, both in and near this 44,619-acre project area. For these reasons, we are making the following comments.</p> <p>The WDA realizes this project largely occurs on private surface, public mineral lands. Despite this, there are several impacts on livestock grazing management that are not analyzed in the EA. Following are specific individual effects upon livestock grazing we request the BLM analyze in the EA before issuing a decision: increased off- and on-road traffic, increased number of speeding vehicles, construction of new roads and modifications to existing roads, destroyed cattle guards, increased number of vehicles in the area causing death or impairments of livestock, opened gates, damaged range improvements, decreased Animal Unit Months (AUMs) and pastures for grazing, decreased palatability of vegetation and forage from road dust and development activities, unsuccessful reclamation of disturbed areas, introduction and spread of noxious and invasive weeds, and other detrimental social and economic impacts on livestock operators and livestock management operations.</p>	<p>The Scott Field Development Project area has 1,551 acres (3.5%) of BLM surface, 2,429 acres (5.4%) State of Wyoming surface and 40,639 acres (91.1%) Privately owned surface.</p> <p>The impacts to rangeland management was not discussed on a project level basis in Section 4.0 of the EA, but were discussed as part of the cumulative impacts analysis in Section 5.0. Based on the lack of BLM-managed public lands (surface estate) in the project area, two intersected grazing allotments with only 54 percent of those allotments located inside the project boundary, the impacts were determined to be negligible on the project level scale, but were included in the cumulative impact analysis.</p> <p>As part of the cumulative analysis, the potential for how many AUMs could be lost was disclosed in Section 5.0 of the EA, as well as the incremental impacts when combined with the past, present, and reasonably foreseeable future actions, as discussed in Table 5-2. In addition, the EA was tiered to and incorporated the Highland Loop Road EA and the analysis for rangeland management, which includes but is not limited to impacts to vegetation including invasive species, soils, water resources, transportation, waste and hazardous materials, and public health and safety.</p>

14	WDA	2	<p>Impacts of the Project will increase costs and decrease revenues for grazing lessees. The accumulated impacts of this and nearby projects could jeopardize the continued existence of grazing operations in this area. The individual and cumulative impacts and the proposed remedies need to be thoroughly identified and evaluated in the EA.</p>	<p>It is the responsibility of the private surface owner to include mitigation for livestock grazing, capturing increased costs and decreased revenues as part of the Surface Use Agreement (SUA). The contents of the SUA are not part of the EA.</p> <p>The BLM does not review the Surface Use Agreements (SUA) between the operator and private surface owner. The SUA is a contract between the two parties and the BLM does not have any authority to include or exclude any content from a SUA. The BLM only requires, per Onshore Order # 1, that the operator must certify in their APD that an agreement with the surface owner has been reached or that a good faith effort to reach an agreement has failed. If no agreement has been reached with the surface owner, the operator must submit an adequate bond to the BLM for the benefit of the surface owner.</p> <p>Boner Brothers Partnership, an affected land owner and grazing lessee has participated in this process and has provided comments of support for the project. See above.</p>
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15	WDA	3	<p>We support compensatory mitigation discussions between commercial operators and livestock lessees to lessen the burden, livestock stress, and economic impacts to grazing lessees from this development. Such mitigation strategies and costs could include, but are not limited to, the following: movement of livestock to an open allotment or pasture, monitoring of impacts, construction of water and range improvements on either public or private land, purchase or lease of additional grazing land to replace lands lost to grazing, and reimbursement to producers for loss of AUMs and pastures.</p>	<p>It is the responsibility of the private surface owner to include mitigation for livestock grazing in the SUA. The contents of the SUA are not part of the EA.</p> <p>The BLM does not review the Surface Use Agreements (SUA) between the operator and private surface owner. The SUA is a contract between the two parties and the BLM does not have any authority to include or exclude any content from a SUA. The BLM only requires, per Onshore Order # 1, that the operator must certify in their APD that an agreement with the surface owner has been reached or that a good faith effort to reach an agreement has failed. If no agreement has been reached with the surface owner, the operator must submit an adequate bond to the BLM for the benefit of the surface owner.</p> <p>Boner Brothers Partnership, an affected land owner and grazing lessee has participated in this process and has provided comments of support for the project. See above.</p>
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