# Chapter 5. Public Involvement, Consultation, and Coordination

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# 5.1. Introduction

Public involvement, consultation, and coordination was initiated prior to, and occurred throughout, preparation of the Lander Resource Management Plan (RMP) revision and associated Environmental Impact Statement (EIS). The Bureau of Land Management (BLM) incorporated public involvement, consultation, and coordination through public meetings, informal meetings, individual contacts, news releases, newsletters, workshops, a planning website, and the *Federal Register*. This chapter describes the public involvement process, as well as other key consultation and coordination activities undertaken to prepare the EIS in support of the RMP revision.

The BLM decision-making process is conducted in accordance with the requirements of the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations implementing NEPA, and the United States (U.S.) Department of the Interior (DOI) and BLM policies and procedures implementing NEPA. NEPA and the associated regulatory and policy framework require that all federal agencies involve the interested public and potentially affected parties in their decision-making, consider reasonable alternatives to proposed actions, and prepare environmental documents that disclose the potential impacts of proposed actions and alternatives.

A Notice of Intent (NOI) published in the *Federal Register* on February 13, 2007, formally announced the BLM's intent to revise the existing plan and prepare the associated EIS. The NOI initiated the scoping process and invited participation of affected and interested agencies, organizations, and members of the public in determining the scope and issues to be addressed by alternatives and analyzed in the EIS. The BLM solicited additional public involvement at multiple meetings, including an open house and cooperating agency workshops, to help identify issues to be addressed in developing a full range of land management alternatives. Subsequent to the release of the Draft RMP and EIS on September 9, 2011, the BLM held three commenting workshops in September 2011 and five public meetings in October 2011 to discuss the commenting process, respond to questions, and solicit comments on the Draft RMP and EIS. Table 5.1, "Public Involvement, Coordination, and Consultation Events" (p. 1337) lists public involvement, coordination, and consultation events.

**Table 5.1. Public Involvement, Coordination, and Consultation Events**

| Date | Location | Event | Type |
|---|---|---|---|
| March 19, 2007 | Riverton, Wyoming | Public Scoping Meeting | Public Meeting |
| March 20, 2007 | Shoshoni, Wyoming | Public Scoping Meeting | Public Meeting |
| March 21, 2007 | Jeffrey City, Wyoming | Public Scoping Meeting | Public Meeting |
| March 22, 2007 | Dubois, Wyoming | Public Scoping Meeting | Public Meeting |
| March 23, 2007 | Lander, Wyoming | Public Scoping Meeting | Public Meeting |
| June 13, 2007 | Lander, Wyoming | Socioeconomic Meeting | Cooperating Agency Meeting |
| August 14, 2007 | Lander, Wyoming | Socioeconomic Meeting | Cooperating Agency Meeting |
| November 5, 2007 | Lander, Wyoming | Travel Management Meeting | Public Meeting |
| November 6, 2007 | Lander, Wyoming | Travel Management Meeting | Public Meeting |
| November 7, 2007 | Dubois, Wyoming | Travel Management Meeting | Public Meeting |
| November 8, 2007 | Dubois, Wyoming | Travel Management Meeting | Public Meeting |
| January 24, 2008 | Riverton, Wyoming | Travel Management Meeting | Public Meeting |
| March 18 – 20, 2008 | Lander, Wyoming | Goals and Objectives Development Workshop | Cooperating Agency Workshop |
| May 21 – 23, 2008 | Lander, Wyoming | Range of Alternatives Development Workshop | Cooperating Agency Workshop |

| Date | Location | Event | Type |
|---|---|---|---|
| June 18 – 20, 2008 | Lander, Wyoming | Range of Alternatives Development Workshop | Cooperating Agency Workshop |
| August 20 – 21, 2008 | Lander, Wyoming | Range of Alternatives Development Workshop | Cooperating Agency Workshop |
| September 24 – 25, 2008 | Lander, Wyoming | Range of Alternatives Development Workshop | Cooperating Agency Workshop |
| December 3 – 5, 2008 | Lander, Wyoming | Range of Alternatives Development Workshop | Cooperating Agency Workshop |
| January 21 – 23, 2009 | Lander, Wyoming | Range of Alternatives Development Workshop | Cooperating Agency Workshop |
| February 18 – 20, 2009 | Lander, Wyoming | Range of Alternatives Development Workshop | Cooperating Agency Workshop |
| December 9, 2009 | Lander, Wyoming | Range of Alternatives Development Workshop | Cooperating Agency Workshop |
| March 31, 2010 | Lander, Wyoming | Open House | Public Meeting |
| May 12 – 14, 2010 | Lander, Wyoming | Preferred Alternative Development Workshop | Cooperating Agency Workshop |
| September 19, 2011 | Lander, Wyoming | Commenting Workshop | Public Meeting |
| September 20, 2011 | Riverton, Wyoming | Commenting Workshop | Public Meeting |
| September 21, 2011 | Dubois, Wyoming | Commenting Workshop | Public Meeting |
| October 24, 2011 | Shoshoni, Wyoming | Draft RMP and EIS Public Meeting | Public Meeting |
| October 25, 2011 | Lander, Wyoming | Draft RMP and EIS Public Meeting | Public Meeting |
| October 26, 2011 | Dubois, Wyoming | Draft RMP and EIS Public Meeting | Public Meeting |
| October 27, 2011 | Riverton, Wyoming | Draft RMP and EIS Public Meeting | Public Meeting |
| October 28, 2011 | Jeffrey City, Wyoming | Draft RMP and EIS Public Meeting | Public Meeting |
| RMP Resource Management Plan<br>EIS Environmental Impact Statement | | | |

# 5.2. Public Involvement

In accordance with CEQ scoping guidance, the BLM provided opportunities for public involvement as an integral part of revising the RMP and preparing the EIS. CEQ scoping guidance (1981) defines scoping as the process by which lead agencies solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed and the methods by which they will be evaluated. The scoping comment summary report, which summarizes comments received during the scoping process, is available on the Lander RMP website at http://www.blm.gov/wy/st/en/programs/Planning/rmps/lander/docs.html.

The intent of the scoping process is to provide an opportunity for the public, tribes, other government agencies, and interest groups to learn about the project and provide input on the planning issues, impacts, and potential alternatives that will be addressed in the EIS, and the extent to which those issues will be analyzed. In general, public involvement during scoping assists the agency through the following:

- Broadening the information base for decision-making
- Informing the public about the EIS and proposed RMP and the potential impacts associated with various management decisions

- Ensuring public needs and viewpoints are brought to the attention of the agency
- Determining the scope and the significant issues to be analyzed in depth in the EIS

## 5.2.1. Scoping Period

The scoping period for the Lander RMP revision began with the publication of the NOI in the *Federal Register* on February 13, 2007 and ended on April 16, 2007. The scoping period provides an opportunity for the public to identify potential planning issues and concerns associated with the RMP and EIS. Information obtained by the BLM during scoping is combined with issues identified by the agencies to form the scope of the EIS.

**Public Notification of Scoping**

The BLM issued a news release to local media on February 13, 2007, describing the Lander RMP revision, and issued a subsequent news release on March 2, 2007, listing the time, date, and location of the public scoping meetings. Copies of the news releases went out to numerous media outlets within and outside the planning area. The news releases were also posted on the Lander RMP website.

In addition to news releases and other notifications from the BLM regarding the scoping process, some members of the public received notification from other sources. Several articles and news bulletins regarding some aspect of the RMP process were published in local newspapers. Many of the articles listed the dates for the scoping period and the dates, times, and locations of public scoping meetings.

The Lander RMP website provides background information on the project, a description of the scoping process and meeting locations, instructions on how to submit comments, and copies of public information documents such as the NOI and the 1987 Lander RMP. The website is one of the methods used to communicate project news and updates to the public. The website can be accessed at: http://www.blm.gov/wy/st/en/programs/Planning/rmps/lander.html.

**Scoping Meetings**

During the week of March 19, 2007, the BLM hosted scoping meetings in five locations across the planning area. Table 5.1, "Public Involvement, Coordination, and Consultation Events" (p. 1337) lists the scoping meeting locations and dates. The five public scoping meetings provided the public with an opportunity to learn and ask questions about the project, the planning process, and to submit their issues and concerns to the BLM. The BLM chose an open house format to encourage broader participation, to allow attendees to learn about the project at their own pace, and to enable attendees to ask questions of BLM representatives in an informal one-on-one setting. The BLM also provided handouts and presented displays at each scoping meeting.

The BLM encouraged meeting attendees to comment by submitting written comment forms (either at the meetings or via U.S. Postal Service) or by sending an e-mail. Comment sheets were available to attendees at all meetings.

## 5.2.2. Public Comment Period on the Draft RMP and EIS

A notice of availability announcing the release of the Draft RMP and EIS was published in the *Federal Register* on September 9, 2011, initiating a 90-day public comment period. The BLM

later extended the comment period for an additional 45 days, ending the comment period on January 20, 2012. During the 135-day public comment period, the public was provided the opportunity to review and comment on the Draft RMP and EIS.

**Notification**

The BLM issued a news release on September 9, 2011, announcing the release of the Draft RMP and EIS, which provided the dates and times of the public commenting workshops. The BLM also distributed a newsletter via U.S. mail and e-mail to individuals on the BLM mailing list, which provided the dates and locations of all commenting workshops and public meetings. In addition to news releases and other notifications from the BLM regarding the comment period, some members of the public received notification from other sources. Several articles and news bulletins regarding the release of the Draft RMP and EIS were published in local newspapers. Many of the articles listed the dates for the public meetings and workshops.

**Public Meetings**

During the public comment period, the BLM held three commenting workshops in September 2011 and five public meetings in October 2011 in towns and cities throughout the planning area (see Table 5.1, "Public Involvement, Coordination, and Consultation Events" (p. 1337) for meeting times and locations). The commenting workshops were offered to inform readers about how to navigate the Draft RMP and EIS, and how to prepare and submit substantive comments. The October public meetings provided additional opportunity for the public to ask questions and submit comments. BLM managers, resource specialists, and other representatives of the BLM were present during these meetings to discuss and answer questions.

**Comment Analysis**

Based on comments received during this period, the BLM revised the RMP where appropriate. Changes made to the Draft RMP and EIS based on comments are reflected in the Proposed RMP and Final EIS. The Comment Analysis Report summarizes all substantive comments received during the 135-day public comment period and the BLM responses to those comments, including how the document was revised based on comments. The report is presented in Appendix X (p. 1829).

## 5.2.3. Other Public Involvement

The BLM held one open house meeting in Lander, Wyoming, on March 31, 2010. Similar to the public scoping meetings, resource specialists and other representatives of the BLM were on hand to personally address questions and provide information to meeting participants. The BLM also hosted five public workshops to obtain information and input on travel management and recreational activities at locations throughout the planning area. Refer to Table 5.1, "Public Involvement, Coordination, and Consultation Events" (p. 1337) for meeting times and locations.

**Mailing List**

The BLM compiled a project mailing list of individuals, agencies, and organizations that participated in past BLM projects or requested to be on the general mailing list. Visitors to the scoping meetings were asked to sign in and provide their mailing address so that they could also be added to the mailing list. Other additions to the mailing list include those individuals who have submitted requests to be added to the list. Duplicate entries, changes of address, and

return-to-sender mailings were deleted from the official project mailing list as identified. Through this process, the general mailing list was revised to approximately 975 entries. Requests to be added to or to remain on the official mailing list will continue to be accepted throughout the planning process.

**Newsletters**

Periodic newsletters have been developed and distributed to keep the public informed of the Lander RMP revision. Eight newsletters have been e-mailed and mailed to individuals on the Lander RMP mailing list. The newsletters have also been made available for download on the Lander RMP website.

**Website**

The Lander RMP website can be found at: http://www.blm.gov/wy/st/en/programs/Planning/rmps/lander.html. The website serves as a virtual repository for documents related to the development of the RMP, including announcements, newsletters, and documents. The documents are available in PDF format to ensure they are accessible to the widest range of interested parties. The website provides the public an opportunity to submit their comments for consideration as part of the planning process and to be added to the project mailing list.

**Field Trips**

On June 18, 2008, the BLM held a field trip to tour portions of the planning area with cooperating agencies. The group visited Red Canyon overlook, Crow's Nest/South Pass, Gilespie/Sweetwater Canyon, and Beaver Rim. At each area, the BLM and cooperating agencies discussed the values as well as the issues of each site in order to better understand and address the management needs of these sites.

The BLM organized field trips from September 8, 2009 to September 11, 2009, that were attended by the BLM and representatives from six Native American tribes. The field trips provided an opportunity for the BLM and the tribal representatives to discuss issues and concerns related to the RMP revision, as well as two other energy related projects proposed in the planning area. The BLM also sought input from tribal representatives about areas of cultural importance to their tribes that might be impacted by these projects. Native American consultation is discussed in Section 5.3.3, "Native American Interests" (p. 1343).

## 5.2.4. Future Public Involvement

Public participation efforts will be ongoing throughout the remainder of the process of revising the RMP and developing the EIS. The Proposed RMP and Final EIS considered all substantive comments received during the 135-day public comment period for the Draft RMP and EIS. Members of the public with standing will have the opportunity to protest the content of the Proposed RMP and Final EIS during the specified 30-day protest period. The Record of Decision will be issued by the BLM following the Governor's Consistency Review and protest resolution.

# 5.3. Consultation and Coordination

This section documents the consultation and coordination efforts undertaken by the BLM throughout the RMP revision process. Title II, Section 202 of the Federal Land Policy and

Management Act (FLPMA) directs the BLM to coordinate planning efforts with Native American tribes, other federal departments, and agencies of the state and local governments as part of its land use planning process. The BLM is directed to integrate NEPA requirements with other environmental review and consultation requirements to reduce paperwork and delays (40 Code of Federal Regulations 1500.4-5). The BLM accomplished coordination with other agencies and consistency with other plans through ongoing communications, meetings, and collaborative efforts with the BLM Interdisciplinary Team, which includes BLM specialists, and federal, state, and local agencies.

## 5.3.1. Cooperating Agencies

The BLM invited local, state, federal, and tribal representatives to participate as cooperating agencies on the Lander RMP revision and EIS. The BLM invited the entities listed below to participate in the process because they have jurisdiction by law or because they could offer special expertise. Those who responded and requested cooperating agency status, are noted with an asterisk (*).

**Counties**

- Carbon County Commission*
- Fremont County Commission*
- Hot Springs County Commission*
- Natrona County Commission
- Sweetwater County Commission*

**Conservation Districts**

- Dubois-Crowheart Conservation District*
- Popo Agie Conservation District*
- Lower Wind River Conservation District*
- Sweetwater County Conservation District*
- Natrona County Conservation District*
- Saratoga-Encampment-Rawlins Conservation District
- Hot Springs Conservation District

**Wyoming State Agencies**

- Office of the Governor*
- Office of State Lands and Investments*
- Wyoming Department of Agriculture*
- Wyoming Department of Environmental Quality*
- Wyoming Department of Revenue
- Wyoming Department of State Parks and Cultural Resources*
- Wyoming Game and Fish Department*
- Wyoming Oil and Gas Conservation Commission*
- Wyoming State Engineer's Office*
- Wyoming State Forestry Division
- Wyoming State Geological Survey*
- Wyoming State Historic Preservation Office*
- Wyoming State Planning Office*
- Wyoming Trails*
- Wyoming Water Development Commission

**Federal Agencies**

- Bureau of Indian Affairs – Wind River Agency
- National Park Service – National Trails System, Intermountain Region*
- U.S. Environmental Protection Agency (EPA), Region 8
- U.S. Forest Service – Shoshone National Forest
- U.S. Fish and Wildlife Service*

**Tribes**

- Eastern Shoshone
- Northern Arapaho
- Crow Tribe
- Oglala Sioux
- Rosebud Sioux
- Northern Cheyenne
- Cheyenne River Sioux
- Northern Ute
- Shoshone Bannock

The BLM formally invited the cooperating agencies to participate in developing the alternatives, RMP and EIS, and to provide data and other information relative to their agency responsibilities, goals, mandates, and expertise. Cooperating agencies provided input during the initial scoping process, and throughout the revision process the BLM held general meetings with cooperating agencies to discuss procedures and processes. The BLM and cooperating agencies held several workshops to develop goals and objectives, a range of alternatives, and the Preferred Alternative between March 2008 and May 2010. Cooperating agencies have also provided comments on draft RMP related documents throughout the revision process. Refer to Table 5.1, "Public Involvement, Coordination, and Consultation Events" (p. 1337) for a list of meeting dates.

## 5.3.2. Section 7 Consultation

The Lander Field Office contacted the U.S. Fish and Wildlife Service (USFWS) regarding Section 7 of the Endangered Species Act and the Lander RMP revision. On September 6, 2007, the USFWS provided a list of threatened and endangered species likely to occur on BLM-administered land in the Lander Field Office, for evaluating BLM Section 7 responsibilities. The USFWS was also provided opportunities to comment on draft RMP related documents during the revision process. A copy of the September 2007 consultation letter is located in Section 5.5, "Consultation Letters" (p. 1349). The USFWS provided comments on the preliminary draft Biological Assessment. The Lander Field Office will continue consultation with the USFWS throughout the RMP revision process.

## 5.3.3. Native American Interests

Consultation with Native American tribes is a requirement of FLPMA and BLM guidance. On February 2, 2005, the BLM sent letters inviting Native American tribes to be cooperating agencies as part of the RMP revision. The BLM sent additional letters on August 10, 2009 to the 16 tribes listed below requesting further input on issues of religious and cultural importance. Consultation letters are located in Section 5.5, "Consultation Letters" (p. 1349).

- Cheyenne River Sioux
- Crow Nation
- Eastern Shoshone
- Northern Arapaho
- Northern Cheyenne
- Ute Indian
- Oglala Sioux
- Rosebud Sioux
- Shoshone Bannock
- Southern Cheyenne and Arapaho
- Three Affiliated Tribes of Mandan, Hidatsa, and Arikira Nation
- Lower Brule Sioux
- Yankton Sioux
- Fort Peck Assiniboine Sioux
- Standing Rock Sioux
- Crow Creek Sioux

The BLM requested specific information from the tribes to help identify areas of special concern and to gather input on appropriate protection measures for sensitive cultural sites. The letters also invited tribal representatives to participate in field trips within the planning area in September 2009. BLM representatives followed these letters with telephone calls to each tribe. In letters and during the follow-up calls, the BLM stressed its desire for tribal input on the Draft RMP and EIS. Representatives from six tribes attended the field trips which were held from September 8, 2009 to September 11, 2009. Government-to-government consultation with the tribes will continue throughout the RMP revision process.

## 5.4. Distribution List

The BLM distributed the Proposed RMP and Final EIS to the following entities for their review:

**TRIBAL GOVERNMENTS**

- Eastern Shoshone
- Northern Arapaho
- Crow Tribe
- Oglala Sioux
- Rosebud Sioux
- Northern Cheyenne
- Cheyenne River Sioux
- Northern Ute
- Shoshone Bannock

**LOCAL GOVERNMENTS (COUNTIES, CITIES, TOWNS)**

**Carbon County, Wyoming**

- Carbon County Commission
- Saratoga-Encampment-Rawlins Conservation District
- City of Rawlins
- Town of Saratoga

**Fremont County, Wyoming**

- Fremont County Commission
- Dubois-Crowheart Conservation District
- Lower Wind River Conservation District
- Popo Agie Conservation District
- City of Lander
- City of Riverton
- Town of Dubois

**Hot Springs County, Wyoming**

- Hot Springs County Commission
- Hot Springs Conservation District
- Town of Thermopolis

**Natrona County, Wyoming**

- Natrona County Commission
- Natrona County Conservation District
- City of Casper

**Sweetwater County, Wyoming**

- Sweetwater County Commission
- Sweetwater County Conservation District
- City of Rock Springs
- City of Green River

**Teton County, Wyoming**

- Teton County Commission
- Teton Conservation District

**STATE OF WYOMING**

- Senator Leland Christensen
- Senator Eli Bebout
- Senator Cale Case
- Senator Bernadine Craft
- Senator Larry Hicks
- Senator Gerald Geis
- Senator Kit Jennings
- Senator Bill Landen
- Senator Drew Perkins
- Senator Charles Scott
- Senator John Hastert
- Senator Stan Cooper
- Senator Don Dockstader
- Representative Donald Burkhart, Jr.
- Representative Jerry Paxton
- Representative W. Patrick Goggles
- Representative Lloyd Larsen
- Representative David Miller
- Representative Rita Campbell
- Representative Keith Gingery
- Representative Mark Baker
- Representative Nathan Winters
- Representative Tom Walters
- Representative John Freeman
- Representative Gerald Gay
- Representative Kendell Kroeker
- Representative Bunky Loucks
- Representative Steve Harshman

- Representative Thomas Lockhart
- Representative Tom Reeder
- Representative Tim Stubson
- Representative Stan Blake
- Representative Stephen Watt
- Representative Kathy Davison
- Representative Allen Jaggi
- Representative Ruth Petroff
- Representative Marti Halverson

**WYOMING STATE AGENCIES**

- Office of the Governor, Environmental Policy Division
- Office of State Lands and Investments
- Wyoming Business Council
- Wyoming Department of Administration and Information
- Wyoming Department of Agriculture
- Wyoming Department of Employment, Research, and Planning Division
- Wyoming Department of Environmental Quality
  - Air Quality Division
  - Land Quality Division
  - Water Quality Division
- Wyoming Department of Revenue
- Wyoming Department of State Parks and Cultural Resources
- Wyoming Department of Transportation
- Wyoming Game and Fish Department
- Wyoming State Engineer's Office
- Wyoming State Forestry Division
- Wyoming State Geological Survey
- Wyoming State Historic Preservation Office
- Wyoming State Planning Office
- Wyoming Trails

**WYOMING STATE BOARDS/COMMISSIONS**

- Air Quality Advisory Board
- Board of Wildlife Commissioners
- Natural Gas Pipeline Authority
- Agriculture Board
- Environmental Quality Council
- Farm Bureau Federation
- Land Quality Advisory Board
- Livestock Board
- Mining Council
- Wyoming Oil and Gas Conservation Commission
- Recreation Commission
- State Board of Outfitters and Professional Guides
- State Grazing Board
- Wyoming Trails Advisory Council
- Wyoming Water Development Commission

## WEED AND PEST CONTROL DISTRICTS

- Carbon County Weed and Pest Control District
- Fremont County Weed and Pest Control District
- Hot Springs County Weed and Pest Control District
- Natrona County Weed and Pest Control District
- Sweetwater County Weed and Pest Control District

## ASSOCIATIONS/COUNCILS

- Coalbed Methane Coordination Coalition
- Mormon Trails Association
- Oregon-California Trails Association
- Petroleum Association of Wyoming
- Wildlife Habitat Council
- Wyoming Association of Municipalities
- Wyoming Association of Conservation Districts
- Wyoming County Commissioners Association
- Wyoming Mining Association
- Wyoming Natural Diversity Database
- Wyoming Outdoor Council
- Wyoming Stockgrowers Association
- Wyoming Wilderness Association
- Wyoming Woolgrowers Association
- Independent Petroleum Association of Mountain States

## CLUBS/ALLIANCES/SOCIETIES/GROUPS

- Alliance for Historic Wyoming
- Audubon Society
- Audubon Wyoming
- Back Country Horsemen of America
- Biodiversity Conservation Alliance
- Foundation for North American Wild Sheep
- Greater Yellowstone Coalition
- Guardians of the Range
- Izaak Walton League
- Land and Water Fund of the Rockies
- Murie Audubon Society
- National Wildlife Federation
- North American Pronghorn Foundation
- Public Lands Advocacy
- Rocky Mountain Elk Foundation
- Sierra Club
- The Conservation Fund
- The Land Trust Alliance
- The Nature Conservancy
- The Wilderness Society
- The Wildlife Society
- Trout Unlimited
- Western Lands Project
- Western Watersheds Project

- Wyoming Wildlife Federation
- Wyoming Wildlife and Natural Resource Trust

**CONGRESSIONAL DELEGATION**

- U.S. Senator Michael Enzi
- U.S. Senator John Barrasso
- U.S. Representative Cynthia Lummis

**U.S. DEPARTMENT OF THE INTERIOR**

- Bureau of Indian Affairs
- Bureau of Reclamation
- National Park Service
- Office of Environmental Policy and Compliance
- Natural Resources Library
- Office of Surface Mining
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
  - Washington, D.C.
  - Cheyenne, Wyoming
- Bureau of Land Management
  - Washington, D.C.
  - Wyoming State Office, Cheyenne
  - Wind River/Bighorn Basin District
  - Wyoming Field Offices: Buffalo, Casper, Cody, Kemmerer, Newcastle, Pinedale, Rawlins, Rock Springs, and Worland

**OTHER FEDERAL AGENCIES**

- U.S. Environmental Protection Agency
- U.S. Department of Agriculture Forest Service
  - Shoshone National Forest
- U.S. Department of Agriculture Natural Resources Conservation Service
- U.S. Army Corps of Engineers
- Department of Energy Western Area Power Administration
- Federal Highway Administration
- Federal Energy Regulatory Commission
- U.S. Government Printing Office
- Oceanic and Atmospheric Administration's National Weather Service

**LIBRARIES**

- Library of Congress
- University of Wyoming Library
- Carbon County Library
- Fremont County Public Library
- Hot Springs County Library
- Natrona County Library
- Sweetwater County Library

**EDUCATIONAL INSTITUTIONS**

- Central Wyoming College

- University of Wyoming
- Western Wyoming Community College
- Wyoming Community College Commission

**MEDIA**

**Newspapers**

- Casper Journal, Casper, Wyoming
- Casper Star Tribune, Casper, Wyoming
- Dubois Frontier, Dubois, Wyoming
- Rawlins Daily Times, Rawlins, Wyoming
- Lander Journal, Lander, Wyoming
- Riverton Ranger, Riverton, Wyoming
- Rock Springs Rocket-Miner, Rock Springs, Wyoming
- The Independent Record, Thermopolis, Wyoming
- Wyoming Livestock Roundup, Casper, Wyoming

**Radio**

- KTHE - AM, Thermopolis
- KVOW - AM/KTAK - FM, Riverton
- KOVE - AM/KDLY - FM, Lander
- KTWO - AM/KMGW - FM/KUWC - FM, Casper
- KUGR - AM, Green River (Sweetwater County)
- KRKK - AM/KUWZ - FM, Rock Springs
- KIQZ - FM/KRAL - AM, Rawlins
- K217BP - FM, Dubois
- Wyoming Public Radio, Laramie

# 5.5. Consultation Letters

## Section 7 Consultation Letter

BLM-0036

United States Department of the Interior

FISH AND WILDLIFE SERVICE

**Ecological Services**
**5353 Yellowstone Road, Suite 308A**
**Cheyenne, Wyoming 82009**

**In Reply Refer To:** **SEP - 6 2007**

ES-61411/W.02/WY07SL0470

Memorandum

To: Robert Ross, Field Manager, Bureau of Land Management, Lander Field Office, Lander, Wyoming
From: Brian T. Kelly, Field Supervisor,U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Species List for Lander Field Office

Please find attached the U.S. Fish and Wildlife Service's (Service) current list of endangered, threatened, non-essential/experimental and candidate species which may occur within the Bureau of Land Management, Lander Field Office's (Bureau) area of management. This memorandum supersedes our August 8, 2007, based on (1) reviewing of species potential range and (2) changes in species status. The list is provided as a general reference for the Bureau to use when evaluating actions under the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.)*. We have included information that may be useful in the development of a project assessment for listed species, as well as other areas of Service trust authorities such as the Migratory Bird Treaty Act (16 U.S.C. 703), the Bald and Golden Eagle Protection Act (16 U.S.C. 668), and wetlands protection.

Although we intend to update this list annually or when additions or changes in species' status occur, the Bureau should contact this office to verify the list before analyzing any federal action. If you have any questions regarding this letter or your responsibilities under the Act, please contact Alex Schubert of my staff at (307) 772-2374, extension 238.

Attachments (3)

cc: BLM, T&E Coordinator, Cheyenne (J. Carroll)
BLM, Wildlife Biologist, Lander (S. Oberlie)
BLM, Wildlife Biologist, Lander (G. Morgan)
WGFD, Statewide Habitat Protection Coordinator, Cheyenne (V. Stelter)
WGFD, Non-Game Coordinator, Lander (B. Oakleaf)

BLM-0036

Attachment 1

United States Department of the Interior

FISH AND WILDLIFE SERVICE

**Ecological Services**
**5353 Yellowstone Road, Suite 308A**
**Cheyenne, Wyoming 82009**

**Threatened and Endangered Species and Candidate Species**
**Bureau of Land Management, Lander Field Office**
Updated September 4, 2007

| Species | Status | Expected Occurrence |
|---|---|---|
| Black-footed ferret *(Mustela nigripes)* | Endangered | Prairie dog towns |
| Blowout penstemon *(Penstemon haydenii)* | Endangered | Sand dunes |
| Gray wolf *(Canis lupus)* | Experimental | Greater Yellowstone ecosystem |
| Canada lynx *(Lynx canadensis)* | Threatened | Montane forests |
| Desert yellowhead *(Yermo xanthocephalus)* | Threatened | Beaver Rim, Fremont County |
| Critical Habitat for Desert Yellowhead | Designated | Beaver Rim, Fremont County |
| Ute ladies'-tresses *(Spiranthes diluvialis)* | Threatened | Seasonally moist soils and wet meadows of drainages below 7000 feet elevation. |

If the proposed action will lead to water depletion (consumption) in the Platte river systems, impacts to the following species and critical habitat should be included in the evaluation:

| | | |
|---|---|---|
| Whooping crane *(Grus americana)* | Endangered | Downstream riparian and riverine habitat of the Platte River system |
| Interior least tern *(Sterna antillarum)* | Endangered | see above |

| | | |
|---|---|---|
| Piping plover *(Charadrius melodus)* | Threatened | see above |
| Pallid sturgeon *(Scaphirhynchus albus)* | Endangered | see above |
| Western prairie fringed orchid *(Platanthera praeclara)* | Threatened | see above |
| Critical habitat for Whooping crane Piping plover | Designated | |

**Federal Agency Responsibilities**
The Service has responsibility, under a number of federal laws, treaties, executive orders, and memoranda of agreement, for the conservation and management offish and wildlife resources. Some of these same authorities also require other federal agencies to consider, avoid, or prevent adverse impacts to fish, wildlife, and wetland resources. To ensure resources are afforded adequate consideration and protection, federal agencies are often required to consult with the Service regarding potential impacts their actions may have on fish and wildlife resources.

When reviewing proposed actions of other agencies, this office normally focuses on three broad categories of trust resources: (1) threatened, endangered, and candidate species, (2) migratory birds, and (3) wetlands and riparian areas. The Service provides recommendations for protective measures for threatened and endangered species in accordance with the Act. Protective measures for migratory birds are provided pursuant to the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703 and Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668. Wetlands are protected pursuant to Section 404 of the Clean Water Act, Executive Order 11990 (wetland protection) and Executive Order 11988 (floodplain management) with the goal of "no net loss of wetlands." Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661 *et seq.),* and the Fish and Wildlife Act of 1956, as amended (16 U.S.C. 742a-742j).

Federal agency actions may range from small, site specific, short duration projects to expansive, long-term programs. Because of the wide range of possible actions, the Service provides the following comments with the understanding that this list of comments may not be all inclusive or may not be applicable for each federal project.

Regulations implementing the Act at 50 CFR §402.12 require the preparation of a biological assessment for any federal action that is a major construction activity to determine the effects of the proposed action on listed and proposed species. If a biological assessment is not required (i.e., all other actions), the lead federal agency is responsible for review of proposed activities to determine whether listed species will be affected. If it is determined that the proposed activities may affect a listed species, you should contact the Service to discuss consultation requirements. If it is determined that any federal agency program or project "is likely to adversely affect" any listed species, formal consultation should be initiated with this office. Alternatively, informal consultation can be continued so the Service can assist you in determining how the project could be modified to reduce impacts to listed species to the "not likely to adversely affect" threshold.







If it is concluded that the project "is not likely to adversely affect" listed species, you should request that the Service review the assessment and concur with the determination.

For those actions where a biological assessment is necessary, it should be completed within **180 days** of receipt of a species list. This deadline can be extended by mutual agreement between the lead agency and the Service. If the assessment is not initiated within 90 days of receipt of a species list, the list of threatened and endangered species should be verified with the Service prior to initiation of the assessment. The biological assessment may be undertaken as part of the agency's compliance with section 102 of the National Environmental Policy Act (NEPA), and incorporated into the NEPA documents. The Service recommends that biological assessments include:

1. A description of the project.
2. A description of the specific area potentially affected by the action.
3. The current status and habitat use of threatened and endangered species in the project area.
4. A discussion of the methods used to determine the information in item 3.
5. The direct and indirect impacts of the project to threatened and endangered species.
6. An analysis of the effects of the action on listed and proposed species and their habitats including cumulative impacts (pursuant to the Act) from State, or private projects in the area.
7. Measures that can potentially reduce or eliminate adverse impacts to threatened and endangered species.
8. The expected status of threatened and endangered species in the future (short and long term) during and after project completion.
9. A determination of "is likely to adversely affect" or "is not likely to adversely affect" for listed species.
10. A determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species.
11. Alternatives to the proposed action considered, a summary of how impacts of those alternatives on listed and proposed species would differ from the proposed actions, and the reasons for not selecting those alternatives.
12. Citations of literature and personal contacts used in the assessment.

**Migratory Birds**
Under the MBTA and BGEPA, the federal agency has a mandatory obligation to protect the many species of migratory birds, including eagles and other raptors which may occur on lands under its jurisdiction. In order to promote the conservation of migratory bird populations and their habitats, the Service recommends that the federal agency implement those strategies outlined within the Memorandum of Understanding directed by the President of the U.S. under Executive Order 13186, where possible.

During project planning analysis of the following information is recommended to determine project effects to migratory birds:

1. The current status and habitat use of migratory birds in the project area. This may include number of individuals, breeding pairs, population trends, and active nests within and adjacent to the project area.

BLM-0036

Attachment 1

2. An analysis of the effects of the proposed action on migratory birds and their habitats. Measures that will reduce or eliminate adverse impacts to migratory birds, including protective buffers, seasonal restrictions, maintenance of habitat within the project area, raptor-proofing power lines, and netting of waste pits.
3. The projected short and long term impacts to migratory birds and their trends during and after project completion using monitoring, modeling and current literature.

Potential adverse effects to migratory birds from power lines should be identified and every attempt to mitigate such effects should be implemented. Structures that are identified as affecting birds should be made safe to prevent subsequent mortalities. If you determine that power poles and/or stretches of power line are resulting in electrocution of migratory birds, especially raptors, the Service requests that specific information be documented regarding these mortalities. Based on regulations pursuant to the MBTA and BGEPA, migratory bird carcasses may only be collected, possessed or moved by state game wardens, Service refuge officers, Service special agents, or persons holding a valid salvage permit issued by the Service and the applicable state. When a migratory bird mortality is observed the Service recommends that as much of the following information as possible be documented: legal location, GPS location, all identifying numbers from the nearest power pole, date of observation, species, photographs of pole (top section), and the dead bird, and directions to the scene. Please contact our office with the information and call or email Dominic Domenici of the Service's Law Enforcement Office at 307-261-6365 /dominic_domenici@fws.gov to report your observation and obtain further guidance. The Service appreciates your efforts to protect migratory birds.

**Wetlands**

The functions and values of wetlands are well documented and are especially important in the arid west. Substantial degradation diminishes the effectiveness of wetlands to function as food, cover, and breeding sites for wetland dependent species; sediment transport systems; water retention/storage sites; contaminant sinks; and chemical exchange sites. To ensure the Service has sufficient information to assess project impacts on wetlands, assessments should include:

1. An enumeration of the acreage of wetlands, by type, impacted by the proposed action.
2. A discussion of why wetlands cannot be avoided.
3. A description of the functions and values of the wetlands, including sediment transport, water storage, habitat for aquatic and terrestrial organisms, and contaminant sinks, as well as the potential risks of water removal for these functions and values.
4. Measures that will reduce or eliminate adverse impacts to wetlands such as a mitigation plan to offset unavoidable impacts, protective buffers, seasonal and physical restrictions, maintenance of the natural hydrograph, and development and implementation of a monitoring program to track the effectiveness of mitigation measures.
5. Results of wetland monitoring or management activities in, or adjacent to, the proposed project site.
6. The anticipated short and long term effects to wetland and riparian areas during and after project completion.

We recommend the federal agency address each of the above concerns where applicable to the project. Without this information it may be difficult for the Service to effectively review assessments.

4

BLM-0036

Attachment 2

United States Department of the Interior

FISH AND WILDLIFE SERVICE

**Ecological Services**
**4000 Airport Parkway**
**Cheyenne, Wyoming 82001**

In Reply Refer To:
ES-61411/BFF/WY7746

February 2, 2004

Dear Interested Party:

This letter is to inform you that black-footed ferret *(Mustela nigripes)* surveys are no longer necessary in black-tailed prairie dog colonies statewide or in white-tailed prairie dog towns except those noted in the attachment. In response to requests from numerous entities and our own review of the situation regarding ferret surveys, the U.S. Fish and Wildlife Service (Service) and others have been evaluating the potential for a previously unidentified black-footed ferret population to occur in Wyoming and the need for conducting black-footed ferret surveys across the entire state. This issue has been especially pertinent when evaluating various activities for compliance with the Endangered Species Act of 1973 (Act), as amended (16 USC 1531 *etseq)*.

The black-footed ferret was listed as an endangered species in 1967, prior to the Act (under the Endangered Species Preservation Act of 1966). The Act prohibits the take of listed species without proper permits and places an additional requirement on activities funded, authorized or carried out by Federal agencies to ensure that such actions will not jeopardize the continued existence of any listed species. The latter process is known as interagency consultation and is outlined in section 7(a)(2) of the Act (50 C.F.R. ' 402.13).

The Service developed the 1989 *Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act* (Survey Guidelines) to assist with section 7 consultations for ferrets. The Survey Guidelines provide a mechanism to evaluate the possibility of locating existing ferrets in prairie dog colonies by examination of the size, density, and juxtaposition of existing prairie dog colonies. The key points of the strategy are to determine the existence of ferrets or an area=s potential for ferret recovery and either may be used in section 7 consultations when determining whether an action may affect the black-footed ferret. The Survey Guidelines can be followed by interested parties (federal agencies and their partners) during the section 7 consultation process to make determinations on whether an activity may adversely affect ferrets. However, an unintended drawback to the Survey Guidelines is that repetitive surveys may be undertaken to evaluate possible impacts to ferrets on prairie dog colonies that have already been searched or that didn=t present any realistic opportunities for ferret reintroduction.

Attachment 2

The Service has been coordinating with the Wyoming Game and Fish Department in reviewing information about the current and historic status of prairie dog towns throughout Wyoming. In addition to the status review, we have also been reviewing the history of black-footed ferret surveys to determine whether the survey guidelines should continue to be applied across the entire state. Through this process, the Service has developed an initial list of blocks of habitat that are not likely to be inhabited by black-footed ferrets. In these areas, take of individual ferrets and effects to a wild population are not an issue and surveys for ferrets are no longer recommended. The term Ablock clearance® has often been used to describe this type of approach. This initial list is based largely on the quality of the habitat today, as well as information regarding past population bottlenecks that may have resulted from plague and poisoning events in particular areas and may have led to the loss of ferrets in the area.

Additional information regarding the survey effort on the specific areas not yet block-cleared is currently being reviewed by the Service. Based on this review, the Service will likely add several blocks of habitat to the list in the future. The Service will continue to collect and review information on any remaining areas to determine if they should be added to the list of areas cleared from the survey recommendation. Therefore, prior to conducting surveys, you should coordinate with the Service to determine which specific areas are recommended for surveys. We have attached our initial list of areas cleared from the ferret survey recommendation. We believe this approach is not only biologically defensible, but also allows all parties involved to focus survey effort and resources on those areas where the likelihood of discovering wild ferrets is greatest.

Please note that Ablock clearance® must not be interpreted to mean that the area is free of all value to black-footed ferrets. These areas, or blocks, are merely being cleared from the need for ferret surveys. Therefore, this clearance from the survey recommendations reflects only the negligible likelihood of a wild population of ferrets occurring in an area. It does not provide insight into an area=s value for survival and recovery of the species through future reintroduction efforts. Nor does this clearance relieve a Federal agency of its responsibility to evaluate the effects of its actions on the survival and recovery of the species. For example, while an action proposed in a cleared area needs no survey and is not likely to result in take of individuals, the action could have an adverse effect upon the value of a prairie dog town as a future reintroduction site and should be evaluated to determine the significance of that effect. Consultation with the Service is appropriate for any agency action resulting in an effect significant enough to diminish a site=s value as a future reintroduction site. Additionally, block clearance of an area does not imply that other values of maintaining the integrity of the prairie dog ecosystem are unimportant.



Attachment 2

We appreciate your efforts to conserve listed species. Without the valuable information collected to date in association with black-footed ferret surveys, we would not be able to undertake this effort to focus ferret surveys on the most promising habitat. If you have any questions regarding this letter or your responsibilities under the Act, please contact Mary Jennings of my staff at the letterhead address or phone (307) 772-2374, extension 32.

Sincerely,

*/s/Brian T. Kelly*

Brian T. Kelly
Field Supervisor
Wyoming Field Office

Enclosure (1)

cc: WGFD, Non-Game Coordinator, Lander, WY (B. Oakleaf)
FWS, BFF Recovery Coordinator, Laramie, WY (M. Lockhart)

BLM-0036

Attachment 3

**Black-footed Ferret Survey Block Clearance List** **February 1,2004**

The following blocks of black-footed ferret habitat are cleared from the recommendation for ferret surveys:
1. All black-tailed prairie dog towns in Wyoming
2. All white-tailed prairie dog towns in Wyoming EXCEPT those identified in the following table.

| Complex Name | Townships | Ranges | Complex Name | Townships | Ranges |
|---|---|---|---|---|---|
| Baxter Basin | T18,T19,T20 | R103, R104 | Fifteen Mile | T47-T49<br>T48 | R97, R98<br>R96 (west half) |
| Big Piney | T28<br>T29,T30,T31 | R111.R112<br>R109-R111 | Flaming Gorge | T12,T13<br>T12-T14<br>T13 | R109<br>R108<br>R107 |
| Bolton Ranch | T17<br>T18,T19 | R86, R88<br>R86-R88 | Manderson | T47, T48<br>T49 | R90, R91<br>R91 |
| Carter | T16.T17<br>T18 | R114-R116<br>R115 | Moxa | T15,T16<br>T17,T18<br>T19,T20<br>T21<br>T22,T23<br>T24 | R112, R113<br>R111-R113<br>R111-R114<br>R110-R113<br>R111-R113<br>R112 |
| Continental Divide | T16<br>T17<br>T18<br>T19<br>T20 | R93-95<br>R92-95, 98-100, 97-98<br>R92-96, 98-99<br>R92-96<br>R92-95 | Pathfinder | T27<br>T28<br>T29 | R85, R86<br>R85-R89<br>R85, R89 |
| Cumberland | T16<br>T17-T19<br>T19, T20 | Rl 18<br>R117<br>RI16 | Saratoga | T14<br>T15<br>T16 | R82, R83<br>R82-R84<br>R83-R85 |
| Dad | T15,T16<br>T17 | R90-R93<br>R92, R93 | Seminoe | T23,T24 | R84, R85 |
| Desolation Flats | T13<br>T14<br>T15<br>T16 | R93-95<br>R93-94<br>R93-94, 96<br>R93-96 | Shamrock Hills | T22, T23<br>T24.T25<br>T26 | R89, R90<br>R89<br>R89, R90 |

## Native American Consultation Letters

1610/Lander RMP

February 2, 2005

CERTIFIED MAIL NO. 7003 1680 0007 2163 7250
RETURN RECEIPT REQUESTED

Ivan Posey
Chairman
Eastern Shoshone Tribe
P.O. Box 217

Ft. Washakie, Wyoming 82514

Dear Chairman Posey:

The Bureau of Land Management (BLM) Lander Field Office (LFO) will be revising the Lander Resource Management Plan (RMP). As part of this project, a supporting environmental impact statement will be prepared. As yet, we have not begun our revision effort, but would like to initiate the collaboration process early to establish effective professional and personal relationships.

The revised Lander RMP is being developed to provide future direction for managing approximately 2.5 million acres of public land and 2.7 million acres of Federal mineral estate in Fremont, Natrona, Sweetwater, Carbon, and Hot Springs counties. Attached is a map of the planning area for easy reference.

We would like to provide an opportunity for you to be a cooperator as we begin the process of revising our RMP.

The Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508) emphasize the use of such cooperation as a means of assuring timely coordination with Tribal, State, Federal, and local agencies in preparation of NEPA analyses and documentation.

We wish to seize every opportunity to work together in a cooperating agency relationship where a Tribal, State or local agency has decision making authority or special expertise that can enhance and enrich BLM's planning efforts. Not only can BLM's decisions for the public lands have an effect on neighboring communities, but Tribal, State and local participation with BLM, in the spirit of NEPA, can help assure that we make the best possible decisions.

Developing partnerships between cooperators and BLM will create a stronger, more efficient NEPA process. This will help lead to sustainable decision making for the lands and resources under our respective jurisdictions, and a healthy economy and environment that will serve all citizens well.

An attached return form is provided for your convenience in responding to this invitation. If you would like further information or want to request a meeting, please contact Carol-Anne Murray, Lander RMP Project Manager at (307) 332-8448. We look forward to working with you on this as well as future cooperative efforts.

Sincerely,

/ s / JACK C. KELLY

Field Manager

2 Attachments:
1 - Map of the planning area
2 - Return form

**CMURRAY:pdr:02/01/05 E Shojtr**

CORRESPONDENCE STAMP

{ } READING FILE
{X} CASE FILE

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Lander Field Office
P.O. Box 589
Lander, Wyoming 82520

TAKE PRIDE IN AMERICA

1610 (050)
Lander RMP Revision
Beaver Creek EIS
GMI EIS

August 10, 2009

CERTIFIED MAIL NO.: 7007 1490 0002 1545 0841
RETURN RECEIPT REQUESTED

Ute Indian Tribe
Mr. Curtis Cesspooch
PO Box 190
Fort Duchesne, UT 84026

Dear Mr. Cesspooch:

The Lander Field Office of the Bureau of Land Management (BLM) is revising its general land use plan, the Lander Resource Management Plan (RMP). The RMP serves as the general guidance for all resource and land use management decisions for BLM-administered lands and resources in the Lander Field Office planning area. The previous RMP was completed in 1987 and needs revision to address new management challenges. The upcoming revision will guide the use, protection, and management of natural and cultural resources in the planning area for approximately the next 20 years. See Attachment "A" for the location of the Lander Field Office planning area.

As part of the RMP revision process, the BLM is continuing to contact various tribes who may have traditional ties to or cultural concerns in the planning area[1]. Identification of important tribal sites or areas of Native American cultural concerns can help guide the protection of these valuable resources though the RMP revision process. A recent successful outcome of tribal consultation during the planning process is Cedar Ridge (a large ridgeline containing numerous rock features and sites important to the Eastern Shoshone and other tribes), which was recently protected by a decision in the Casper Field Office RMP revision. A part of Cedar Ridge is located in the Lander Field Office area, and we would like your input on appropriate protection measures for this area as well.

[1] In accordance with the National Environmental Policy Act, the Federal Land Policy and Management Act, the National Historic Preservation Act, the American Indian Religious Freedom Act, and Executive Order 13007 on Indian Sacred Sites.

In addition to the RMP revision, the Lander Field Office is also working on two separate Environmental Impact Statements for two full field oil and gas developments proposals. These EIS's cover Devon Energy's Beaver Creek Field (south of Riverton), and the combined EnCana Gun Barrel, Conoco-Phillips Madden, and Noble Energy Iron Horse (GMI) fields, which are located in the Lysite area (see Attachment "B" for the locations of these oil and gas fields). The companies propose to develop approximately 230 new wells in the Beaver Creek project and 1400 new wells in the GMI project. These fields are known to contain sites that traditional elders have already expressed interest in, such as rock cairns and alignments, stone circles, possible burial sites, as well as a part of Cedar Ridge.

To better gather the views of tribes with interest in these areas, we are attempting to schedule field trips for traditional leaders or elders to visit sites or areas of concern for the week of September 8-11, 2009 (Attachment "C"). Please note that participating elders would be paid for mileage, per diem, and consultation fees, but that our funding is limited to one representative per tribe. Other participants are welcome, but funding may not be available.

Please indicate on the attached response form (Attachment "D") whether your tribe would be interested in joining us for these field tours, and which elder you would like to participate in this effort. We will follow-up on this letter with a direct e-mail or phone call to confirm your attendance.

If there are additional traditional, cultural or religious leaders or elders who you believe should be contacted to express their interests or concerns regarding the above projects, please include their names in Attachment "D". We look forward to working with you and your tribal members or authorized representatives who have considerable knowledge of tribal history and concerns.

Thank you for your attention, and if you have any questions, please do not hesitate to contact BLM archeologists Craig Bromley or Karina Bryan at 307-332-8400.

Sincerely,

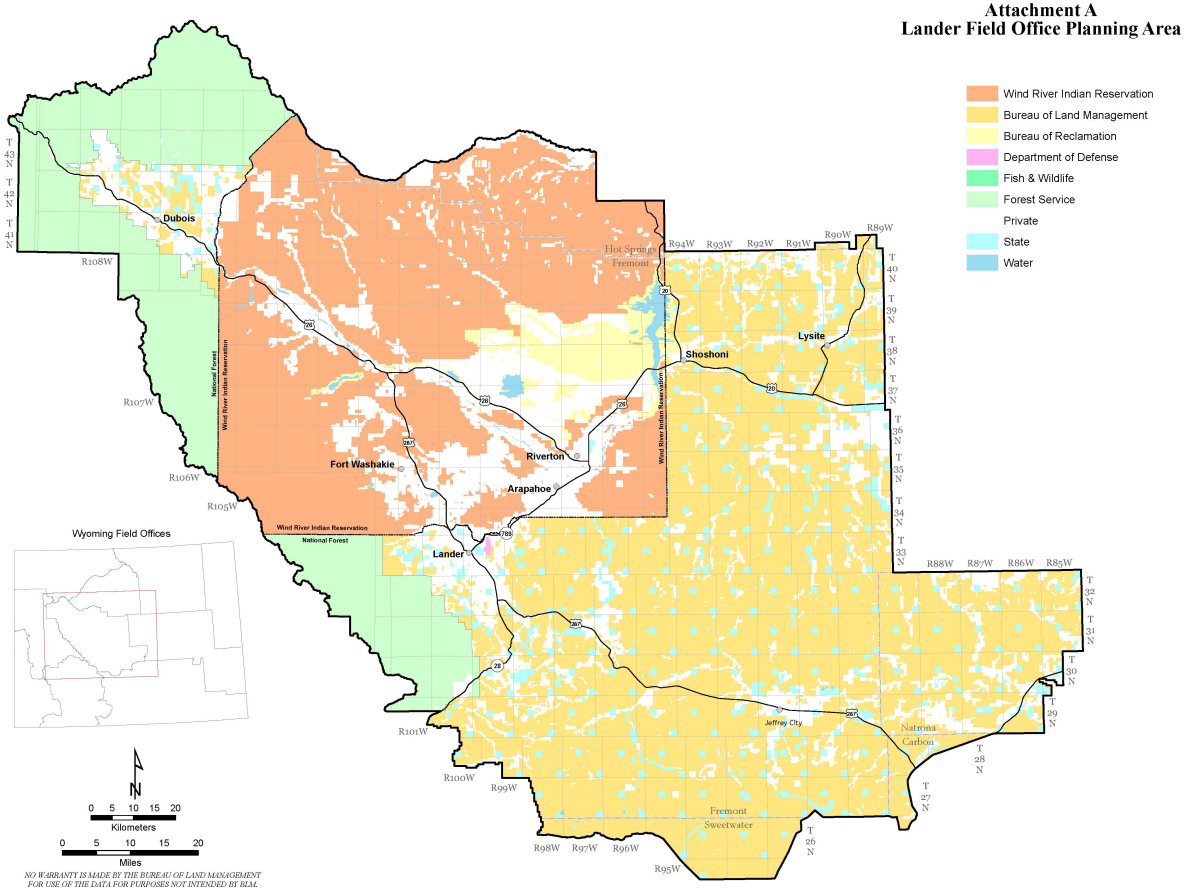
James A. Cagney
Field Manager

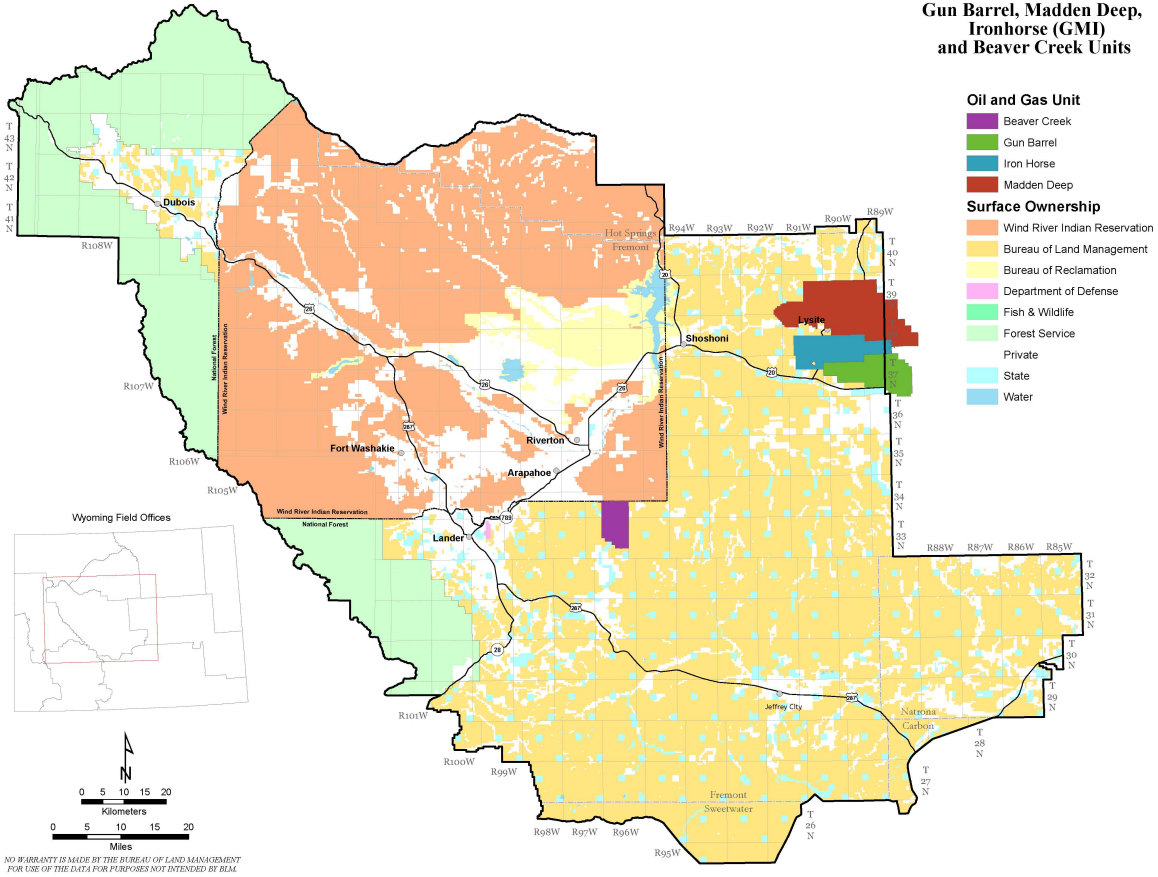
4 Attachments

1 – Attachment A: Map of the Lander RMP planning area
2 – Attachment B: Map of the Beaver Creek and GMI projects areas
3 – Attachment C: Field Consultation Schedule
4 – Attachment D: Response Form

CERTIFIED MAIL NO.:7007 1490 0002 1545 0858
RETURN RECEIPT REQUESTED
cc: Betsy Chapoose
PO Box 190
Ft. Duchesne UT 84026

**Attachment A**
**Lander Field Office Planning Area**




Attachment B
Gun Barrel, Madden Deep, Ironhorse (GMI) and Beaver Creek Units
Oil and Gas Unit
Beaver Creek
Gun Barrel
Iron Horse
Madden Deep
Surface Ownership
Wind River Indian Reservation
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Fish & Wildlife
Forest Service
Private
State
Water
Dubois
Hot Springs
Fremont
Shoshoni
Lysite
Riverton
Fort Washakie
Arapahoe
Lander
Jeffrey City
Natrona
Carbon
Fremont
Sweetwater
Wind River Indian Reservation
National Forest
Wyoming Field Offices
Kilometers
Miles
NO WARRANTY IS MADE BY THE BUREAU OF LAND MANAGEMENT FOR USE OF THE DATA FOR PURPOSES NOT INTENDED BY BLM.

CORRESPONDENCE FILE
[ ] CASE FILE
[X] READING FILE

## ATTACHMENT C

### PROPOSED FIELD CONSULTATION SCHEDULE

| Date | Time | Task |
|---|---|---|
| September 8, 2009 (Tuesday) | 9:00 a.m. | Meet at the Lander BLM office (1335 Main Street, Lander, WY) for orientation and information regarding the RMP and EIS process |
| | 12:30 p.m. | Field trip to the Beaver Creek oil and gas project. If time permits, visit Beaver Rim. |
| | 5:00 p.m. | Back at BLM office |
| September 9, 2009 (Wednesday) | 9:00 a.m. | Meet at the BLM Office; then field trip to the GMI oil and gas project, including Cedar Ridge (sack lunches included). If time permits and elders are agreeable, visit the Castle Gardens Rock Art Site |
| | 5:00 p.m. | Return to the BLM office |
| September 10, 2009 (Thursday) | 9:00 a.m. | Meet at the Lander BLM office; then field trip to sites of interest in other parts of the Lander Field Office RMP planning area (sack lunches included). |
| | 5:00 p.m. | Return to the BLM office |
| September 11, 2009 (Friday) | 9:00 a.m. | Meet at the Lander BLM office; then field trip to sites of interest in other parts of the Lander Field Office RMP planning area (sack lunches included). |
| | 5:00 p.m. | Return to the BLM office |

## ATTACHMENT D

### TRIBAL CONSULTATION RESPONSE FORM REGARDING THE PROPOSED LANDER RMP REVISION AND THE BEAVER CREEK AND GMI EISs

_____ Yes, we are interested in participating in this consultation.

_____ No, we are not interested in participating in this consultation, but information about our concerns is attached. (Any information you provide will be used in a respectful manner, and anything you would like to share with BLM but would prefer not be made public will be kept confidential.)

_____ No, we are not interested in participating in this consultation, and have no further comments.

_____ We would like to receive a copy of the consultation summary notes when they are completed.

Signature: _____ Date: _____

Name and Title_____

Tribal Affiliation: _____

Phone Number and/or Email:_____

Additional Contact Names Recommended:_____

Please return this form to:

Kristin Yannone
Bureau of Land Management
Lander Field Office
P.O. Box 589
Lander, WY 82520

# 5.6. List of Preparers

Table 5.2, "List of Preparers" (p. 1360) lists the name, education, title, project role, and years of experience of the individuals involved in the preparation of this document.

**Table 5.2. List of Preparers**

| Name | Education | Title | Role | Years of Experience |
|---|---|---|---|---|
| ***Bureau of Land Management*** | | | | |
| Kristin Yannone | B.A. History, J.D. Law | Environmental Planner and Coordinator | Project Manager/ Inspector and Team Leader | 22 |
| Jim Cagney | B.S. Range/Forest Management | Field Office Manager | Lander Field Office Manager | 33 |
| Sydney Schoepke | B.S. Land Resource Management, MS Applied Geographic Information Sciences | Geographic Information System Specialist | Geographic Information System Data Management | 3 |
| Greg Bautz | B.S. Resource Management | Soil Scientist | Soil, Surface Water, Invasive Species | 30 |
| Jared Oakleaf | B.A. Geography and Recreation, B.A. Environmental and Natural Resources | Outdoor Recreation Planner | Cave and Karst, Recreation, Travel Management, Wild and Scenic Rivers, Wilderness Study Areas, Areas with Wilderness Characteristics, Visual Resources, Area of Critical Environmental Concern, National Scenic and Historic Trails | 10 |
| Scott Fluer | B.S. Range Science | Wild Horse Specialist | Vegetation, Riparian-Wetland Areas, Livestock Grazing, Area of Critical Environmental Concern | 24 |
| Tim Kramer | B.S. Rangeland Resources and History, M.S. Rangeland Resources, Crops and Soil Sciences | Natural Resource Specialist, Fire and Fuels | Forestry, Fire and Fuels | 14 |
| Sue Oberlie | B.S. Wildlife Management, B.S. Secondary Education | Wildlife Biologist | Fish and Wildlife, Special Status Species, Area of Critical Environmental Concern | 26 |
| Curtis Bryan | B.S. Rangeland Ecology and Watershed Management | Natural Resource Specialist | Riparian-wetland areas, Invasive species | 8 |

| Name | Education | Title | Role | Years of Experience |
|---|---|---|---|---|
| ***Bureau of Land Management*** | | | | |
| Chris Krassin | B.S. Soil Science and Rangeland Ecology | Natural Resource Specialist | Reclamation | 16 |
| Craig Bromley | B.A. Anthropology | Archeologist | Cultural, Paleontology, National Historic Trails, Area of Critical Environmental Concern | 32 |
| Jon Kaminsky | B.A. Geology, M. Sci. Hydrogeology | Assistant Field Manager Minerals | Geology, Solid Minerals | 23 |
| Roy Packer | B.S. Forestry and Range and Watershed Management | Rangeland Management Specialist | Livestock Grazing, Vegetation, Wild Horses | 36 |
| Leta Rinker | B.S. Business Administration, B.A. Business Management | Realty Specialist | Lands and Realty, including Transportation/ Access and Rights-of-way, Renewable Energy Utility/ Communication Corridors, Land Tenure | 25 |
| Rubel Vigil | B.S. Rangeland Management | Assistant Field Manager | Livestock Grazing | 25 |
| Stuart Cerovski | B.S. Petroleum Engineering | Resource Adviser | Fluid Minerals | 26 |
| Roy Allen | B.S. Chemistry, M.S. and PhD Economics | Social Conditions/ Economic Conditions/ Environmental Justice | Socioeconomics | 33 |
| Dean Stillwell | B.S. Geology and M.S. Geology | Geologist | Oil and Gas, Reasonable Foreseeable Development | 32 |
| Stan William Davis-Lawrence | B.S. Math/Physics/ Geophysical Engineering, M.S. Geophysical Engineering | Petroleum Engineer | Oil and Gas, Reasonable Foreseeable Development | 37 |
| Alfred M. Elser | B.S. Geology, M.S. Geology, and Ph.D. Chemistry with a concentration in geochemistry | Petroleum Geologist | Oil and Gas, Reasonable Foreseeable Development | 6 |
| Melissa Hovey | B.S. Civil Engineering, M.S. Environmental Engineering | Air Quality Specialist | Air Resources | 14 |
| ***Consultant*** | | | | |
| ICF International – Interdisciplinary Team | | | | |
| Science Applications International Corporation (SAIC) – Interdisciplinary Team | | | | |

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# Chapter 6. References

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# Bibliography

American Petroleum Institute. 2009. API Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry. August.

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# Glossary

**Active Use:**

The current authorized use, including livestock grazing and conservation use. Active use may constitute a portion, or all, of permitted use. Active use does include temporary nonuse or suspended use of forage within all or a portion of an allotment.

**Allotment:**

An area of land where one or more livestock operators graze their livestock. Allotments are Bureau of Land Management (BLM)-administered lands, but may also include other federally managed, state-owned, and private lands. An allotment may include one or more separate pastures. Livestock numbers and periods of use are specified for each allotment. Allotments are classified by the following:

> Category I – Improve Existing Resource Conditions. Criteria for placing allotments into this category include: (1) present range condition is unsatisfactory and where range condition is expected to decline further; (2) present grazing management is not adequate; (3) the allotment has potential for medium to high vegetative production but production is low to moderate; (4) resource conflicts/controversy with livestock grazing are evident; (5) there is potential for positive economic return on public investment.
>
> Category M – Maintain Existing Resource Conditions. Criteria for placing allotments into this category include: The category for allotments where (1) the present range condition and management are satisfactory with good to excellent condition and will be maintained under present management, or fair condition and improving with improvement expected to continue under present management, or opportunities for BLM management are limited because percentage of public land is low or acreage of public lands is small; (2) the allotment has a potential for moderate or high vegetative production and is producing at or near this potential; (3) there are no significant land-use resource conflicts with livestock grazing; (4) land ownership status may or may not limit management opportunities; (5) opportunities for positive economic return from public investment may exist.
>
> Category C – Custodial Management. Criteria for placing allotments into this category include: The category for allotments where (1) present range condition is not in a downward trend; (2) the allotment has a low vegetative production potential and is producing near this level; (3) there may or may not be limited conflicts between livestock grazing and other resources; (4) present management is satisfactory or is the only logical management under existing conditions; and (5) opportunities for a positive economic return on public investments do not exist.

**Analysis Area:**

Any lands, regardless of jurisdiction, for which the BLM synthesizes, analyzes, and interprets data for information that relates to planning for BLM-administered lands.

**Animal Unit Month:**

A standardized measurement of the amount of forage necessary for the sustenance of one cow unit or its equivalent for 1 month (approximately 800 pounds of forage).

**Areas Administratively Unavailable to Leasing:**
BLM Handbook H-1601-1 – Land Use Planning, Appendix C uses the term areas closed to oil and gas leasing. Areas administratively unavailable or closed to oil and gas leasing are areas where it has been determined that other land uses or resource values cannot be adequately protected with even the most restrictive oil and gas leasing stipulations; appropriate protection can be ensured only by making the areas administratively unavailable to oil and gas leasing for the life of the plan. Lands currently under lease would remain leased for the life of the leases. After expiration of these leases, no lands would be available for lease.

**Authorized Officer:**
A manager/supervisor at a BLM Field Office, District Office, or State Office who has been delegated to take action pursuant to the various provisions of Title 43 Code of Federal Regulations (CFR) – Public Lands.

**Authorized Surface-disturbing Activities:**
Public Land resource uses/activities that disturb the endemic vegetation, surface geologic features, and/or surface/near surface soil resources beyond ambient site conditions that are permitted by previously-approved management actions. Examples of surface-disturbing activities include: construction of well pads and roads, pits and reservoirs, pipelines and powerlines, and most types of vegetation treatments (e.g., prescribed fire, etc.). NOTE: Some resource uses, commodity production and other actions that remove vegetative growth, geologic materials, or soils (e.g., livestock grazing, wildlife browsing, timber harvesting, sand and gravel pits, etc.) are allowed, and in some instances formally authorized, on the public lands. When utilized as a land use restriction, (e.g., No Surface-Disturbing Activities), this phrase prohibits all resource use or activity, except those uses and activities that are specifically authorized, likely to disturb the endemic vegetation, surface geologic features, and surface/near surface soils.

**Avoidance Areas:**
Areas where negative routing factors exist. Rights-of-way (ROWs) either will not be granted in these areas, or, if granted, will be subject to stringent terms and conditions. In other words, ROWs would be restricted, but not necessarily prohibited, in avoidance areas. Special stipulations will likely apply. Current avoidance criteria are provided in Appendix E (p. 1483).

**Big Game Crucial Winter Range:**
Winter habitat on which a wildlife species depends for survival. Because of severe weather conditions or other limiting factors, no alternative habitat would be available.

**Borrow Material:**
A term used in conjunction with construction. The term refers to unprocessed material excavated from a borrow pit for use as fill at another location.

**Carbon Dioxide Flood:**
A carbon dioxide flood is an enhanced oil recovery technique that injects fluid into the reservoir. When carbon dioxide is injected, it mixes with the oil and the two compounds dissolve into one another. The injected carbon dioxide acts as a solvent to overcome forces that trap oil in tiny rock pores and helps sweep the immobile oil left behind after the effectiveness of water injection decreases, resulting in increased oil production.

**Casual Use:**

One of the three types of operations for locatable minerals (43 CFR 3809 et seq.). Casual use means "activities ordinarily resulting in no or negligible disturbance of the public lands or resources" (43 CFR 3809.5). An example of casual use is collection of rock or mineral specimens using hand tools or nonmotorized sluicing. It may include the use of small portable suction dredges. Casual use does not include the use of mechanized earthmoving equipment or truck-mounted drilling equipment and other mechanized devices. See also notice-level operations and Plan of Operations.

**Cheatgrass:**

Cheatgrass is an annual grass that forms tufts up to 2 feet tall. The leaves and sheaths are covered in short, soft hairs. The flowers occur as drooping, open, terminal clusters that can have a greenish, red, or purple hue. Flowering occurs in the early summer. These annual plants will germinate in fall or spring (fall is more common), and senescence usually occurs in summer. Cheatgrass invades rangelands, pastures, prairies, and other open areas. Cheatgrass has the potential to completely alter the ecosystems it invades. It can completely replace native vegetation and change fire regimes and is most problematic in areas of the western United States with lower precipitation levels.

**Class II Wells:**

Injection wells that are:

(1) Brought to the surface in connection with natural gas storage operations, or conventional oil or natural gas production, and may be commingled with wastewaters from gas plants, which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection.

(2) For enhanced recovery of oil or natural gas.

(3) For storage of hydrocarbons that are liquid at standard temperature and pressure.

**Class I Wells:**

Injection wells that are:

(1) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to inject hazardous waste beneath the lowermost formation containing, within ¼ mile of the wellbore, an underground source of drinking water.

(2) Other industrial and municipal disposal wells that inject fluid beneath the lowermost formation containing, within ¼ mile of the wellbore, an underground source of drinking water.

(3) Radioactive waste disposal wells that inject fluid below the lowermost formation containing, within ¼ mile of the wellbore, an underground source of drinking water.

**Closed:**

Generally denotes that an area is not available for a particular use or uses; refer to specific definitions found in law, regulations, or policy guidance for application to individual programs.

**Commodity:**
An economic good, such as a product of agriculture or mining.

**Commodity Production:**
The materialization of an economic good, such as a product of agriculture or mining.

**Communication Site Management Plan:**
A plan that provides for effective administration of a communications site. The site plan defines the principles and technical standards adopted in the site designation. The site plan provides direction for the day-to-day operations of the site in connection with the lease. The site plan shall delineate the types of uses that are appropriate at this site and the technical and administrative requirements for management of the site. The site plan should reflect the complexity of the current situation and the anticipated demand for the site.

**Comprehensive Grazing Strategy:**
A Comprehensive Grazing Strategy is a management approach that incorporates a documented grazing prescription that tailors the timing and intensity (utilization) of grazing to specific vegetation objectives to maintain, or make significant progress toward, fulfillment of the Wyoming Standards for Healthy Rangelands. The grazing prescription is clearly linked to the physiological requirements of the species identified in the objectives and is considerate of other resource values (e.g., greater sage-grouse and critical wildlife habitats). Objectives are established for locations preferred by livestock. A Comprehensive Grazing Strategy gives specific attention to the critical growing season on upland ranges and the hot season in riparian-wetland habitat. The kind and class of livestock along with the season of use will affect the timing and intensity requirements.

**Comprehensive Weed Management Plan:**
A plan for controlling invasive plant species that incorporates integrated weed management techniques and accounts for pertinent considerations, such as management actions and allocations affecting weeds.

**Congressionally Designated Trails:**
In 1968, the National Trails System Act (NTSA) (Public Law 90-543) provided for the development of a national system of trails in urban, rural, and wilderness settings. Originally, the NTSA specified three categories of national trails: National Scenic Trails (NSTs), recreation trails, and connecting or side trails. In 1978, historic trails were added as another category. Today, only Congress can designate National Historic Trails (NHTs) and NSTs. Congressionally Designated Trails in the planning area include the Continental Divide National Scenic Trail (CDNST) and the Oregon, Mormon Pioneer, California, and Pony Express NHTs. Management of Congressionally Designated Trails is guided by Instruction Memorandum 2009-215 (Planning for Special Designations within the National System of Public Lands).

**Controlled Surface Use:**
Surface occupancy or use will be restricted or prohibited unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts. Identified resource values require special operational constraints that may modify the lease rights. Controlled surface use is used for operating guidance, not as a substitute for the No Surface Occupancy (NSO) or Timing Limitation Stipulations (TLS).

**Cooperative Monitoring:**
Joint monitoring by more than one entity.

**Core Area:**
Executive Order 2008-2, which was superseded by Executive Order 2010-4 and again by 2011-5, issued by the Governor of Wyoming, delineated a Core Area to protect populations of greater sage-grouse in the state. The Order also outlines restrictions on the density of future development and other human activities that limit impacts to greater sage-grouse populations.

**Cultural Resource Inventory Levels:**
A three-tiered process for discovering, recording, and evaluating cultural resources.

(a) Class I – A review of existing literature and oral informant data combined with an analysis of a specific geographic region (e.g., an area of potential effect, drainage basin, resource area, etc.).

(b) Class II – A sampling survey usually aimed at developing and testing a predictive model of cultural resource distribution.

(c) Class III – An on-the-ground survey to discover, record, and evaluate cultural resources within a specific geographic area (e.g., usually an area of potential effect for a proposed undertaking).

**Decibel (dB):**
A unit of measurement of the loudness or strength of a signal. One decibel is considered the smallest difference in sound level that the human ear can discern. Decibels are a relative measurement derived from two signal levels; a reference input level and an observed output level. A decibel is the logarithm of the ratio of the two levels. One Bel is when the output signal is 10 times that of the input and one decibel is 1/10th of a Bel.

**Designated Invasive Species:**
Designated invasive species are species that have been formally declared as "noxious" by federal and state governments in accordance with the Federal Noxious Weed Act of 1974, and the Wyoming Weed and Pest Control Act of 1973. Table 3.34, "Wyoming Weed and Pest Control Act Designated List" (p. 382) and Table 3.35, "Declared List of Weeds and Pests by Counties in the Planning Area" (p. 383) identify species that are formally declared noxious and invasive species for Wyoming. The list of federal noxious weeds, as defined by the Federal Noxious Weed Act of 1974, can be found on the Natural Resources Conservation Service website: http://plants.usda.gov/java/noxiousDriver.

**Designated Roads and Trails:**
Specific roads and trails on which some type of motorized vehicle use is allowed, either seasonally or year-long.

**Desired Plant Community:**
Of the several plant communities that may occupy a site, the desired plant community is the community that has been identified through a management plan to best meet the plan's objectives for the site. At a minimum, it must protect the site.

**Disruptive Activities:**
Those public land resource uses/activities that are likely to alter the behavior, displace, or cause excessive stress to existing animal or human populations occurring at a specific location

and/or time. In this context, disruptive activity(ies) refers to those actions that alter behavior or cause the displacement of individuals such that reproductive success is adversely affected, or an individual's physical ability to cope with environmental stress is compromised. This term does not apply to the physical disturbance of the land surface, vegetation, or features. Examples of disruptive activities may include noise, human foot or vehicle traffic, domestic animal roundups, or other human presence regardless of the activity. When administered as a land use restriction (e.g., No Disruptive Activities), this term may prohibit or limit the physical presence of sound above ambient levels, light beyond background levels, and/or the nearness of people and their activities. The term is commonly used in conjunction with protecting wildlife during crucial life stages (e.g., breeding, nesting, birthing, etc.), although it could apply to any resource value on the public lands. The use of this land use restriction is not intended to prohibit all activity or authorized uses.

**Ecological Integrity:**
The condition of an unimpaired ecosystem as measured by combined chemical, physical (including physical habitat), and biological attributes.

**Ecological Site:**
A kind of land with a specific potential natural community and specific physical site characteristics, differing from other kinds of land in that the site has the ability to produce distinctive kinds and amounts of vegetation and to respond to management. Ecological sites are defined and described with information about soil, species composition, and annual production.

**Ephemeral Stream:**
A stream that flows only in direct response to precipitation, and whose channel is at all times above the water table. Confusion over the distinction between intermittent and ephemeral streams may be minimized by applying Meinzer's suggestion that the term "ephemeral" be arbitrarily restricted to streams that do not flow continuously for at least 30 days (Prichard et al. 1998). Ephemeral streams support riparian-wetland areas when streamside vegetation reflects the presence of permanent subsurface water.

**Exceedance:**
An event in which measurements of ambient air quality are above the National Ambient Air Quality standard (NAAQS) or Wyoming Department of Environmental Quality (DEQ) standard set for a particular pollutant. For example, an annual average nitrogen dioxide value of 110 micrograms per cubic meter ($\mu g/m^3$) is an exceedance of both the NAAQS and Wyoming DEQ annual average standard for nitrogen dioxide of 100 $\mu g/m^3$.

**Exception:**
A one time exemption for a particular site within an oil and gas leasehold. Exceptions are determined on a case-by-case basis and the stipulation continues to apply to all other sites within the leasehold.

**Exclusion Areas:**
Areas not available for location of ROWs under any circumstances (BLM 2005b).

**Extensive Recreation Management Areas:**
Administrative units that require specific management consideration to address recreation use, demand, or Recreation and Visitor Services program investments. The Extensive Recreation Management Areas (ERMA) are managed to support and sustain the principal recreation

activities and the associated qualities and conditions of the ERMA. Management of ERMAs is commensurate with management of other resources and resource uses.

**Final Reclamation:**
The long germ goal identified by the Wyoming Reclamation Policy (WY-2012-034) to facilitate eventual native plant community and ecosystem reconstruction to maintain a safe and stable landscape, and meet the desired outcomes of the land use plan.

**Fire Management Plan:**
Identifies appropriate strategies to achieve resource objectives. Identifies fire policy, objectives, and prescribed actions; may include maps, charts, tables, and statistical data.

**Fire Regime Condition Class:**
A classification of the amount of departure from the natural fire regime. The departure results in changes to one or more of the following ecological components: vegetation characteristics (e.g., species composition, structural stages, stand age, canopy closure, and mosaic pattern), fuel composition, fire frequency, severity, and pattern, and other associated disturbance (e.g., insect and disease mortality, grazing, and drought). The three condition classes are listed below.

(a) Condition Class 1

- The historic disturbance regime is largely intact and functioning (e.g., has not missed a fire return interval).
- Potential intensity and severity of fire within historic range.
- Effects of disease and insects within historic range.
- Hydrologic functions within normal historic range.
- Vegetation composition and structure resilient to disturbances.
- Nonnative species currently not present or to a limited extent.
- Low risk of loss for key ecosystem components.

(b) Condition Class 2

- Moderate alterations to historic disturbance regime evident (e.g., missed one or more fire return intervals).
- Effects of disease and insects pose an increased risk of loss of key community components.
- Riparian-wetland areas and associated hydrologic function show measurable signs of adverse departure from historic conditions.
- Vegetation composition and structure shifted toward conditions less resilient to disturbances.
- Populations of nonnative species may have increased, increasing the risk of further increases following disturbance.

(c) Condition Class 3

- Historic disturbance regime significantly altered; historic disturbance processes and impacts may be precluded (e.g., missed several fire return intervals).
- Effects of disturbance (fire, insects, and disease) may cause significant or complete loss of key community components.
- Hydrologic functions may be adversely altered; high potential for increased sedimentation and reduced streamflows.
- Invasive, nonnative species may be common and in some cases the dominant species on the landscape; disturbance will likely increase both the dominance and geographic extent of these invasive species.
- Highly altered vegetation composition and structure predisposes community to disturbance events outside the range of historic availability; disturbance may have effects not observed or measured before.

**Fire Return Interval:**
The number of years between two successive fire events at a specific site or area.

**Flaring/Venting:**
The controlled burning (flare) or release (vent) of natural gas that cannot be processed for sale or use because of technical or economic reasons.

**Floodplain Connectivity:**
Maintenance of lateral, longitudinal, and vertical pathways for biological and hydrological processes in the floodplain. Examples of failures to maintain connectivity could include culverts or levees that restrict flow in the floodplain and that focus overbank flow into the channel.

**Flushing Livestock:**
Flushing livestock is the holding of livestock in an invasive, nonnative plant species seed-free area where they are fed an invasive, nonnative plant species seed-free ration for 72 hours, thus flushing invasive, nonnative plant species seed from the animals' digestive systems.

**Foreground-Middle Ground Zone:**
An area that can be seen from a travel route for a distance of 3 miles (foreground) to 5 miles (middle ground) where management activities might be viewed. A distance from 5 to 15 miles is called the Background Zone and the area beyond 15 miles is called the Seldom-Seen Zone.

**Geologic Resources:**
Resources associated with the scientific study of the Earth, including its composition, structure, physical properties, and history. Geologic resources commonly include the study of minerals (mineralogy) and rocks (petrology), the structure of the Earth (structural geology) and volcanic phenomena (volcanology), and landforms and the processes that produce them (geomorphology and glaciology).

**Goal:**
A broad statement of a desired outcome. Goals are usually not quantifiable and may not have established timeframes for achievement.

**Grazing Relinquishment:**
The voluntary and permanent surrender by an existing permittee or lessee (with concurrence of any base property lineholder(s)), of their priority (preference) to use a livestock forage allocation on public land as well as their permission to use this forage. Relinquishments do not require consent or approval by the BLM. The BLM's receipt of a relinquishment is not a decision to close areas to livestock grazing.

**Guzzler:**
A water development for wildlife.

**Heavy Equipment Use:**
This phrase is used in fire management and is relative to limiting fire suppression tactics. In this context it refers to not using dozers, skidders, or graders in areas where important resource values are in need of protection. Fire engines and water tenders used during suppression activities would be allowed.

**Held by Production:**
Leases that become productive and do not terminate until all wells on the lease have ceased production.

**Historic American Buildings Survey/Historic American Engineering Record:**
The Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) is an integral component of the federal government's commitment to historic preservation. The program documents important architectural, engineering and industrial sites throughout the United States and its territories. A complete set of HABS/HAER documentation, consisting of measured drawings, large-format photographs, and written history plays a key role in accomplishing the mission of creating an archive of American architecture and engineering and in better understanding what historic resources tell us about America's diverse ethnic and cultural heritage. To insure that such evidence is not lost to future generations, the HABS/HAER Collections are archived at the Library of Congress, where they are made available to the public.

**Hot Season:**
The part of the grazing season that occurs during the hot part of the summer between June 15 and August 31.

**Hummocking:**
A small, rounded or cone-shaped, low hill or a surface of other small, irregular shapes.

**Impact Analysis for Planning 2000 Model:**
Impact Analysis for Planning (IMPLAN) 2000 Model is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. The model provides estimates of how a specific economic activity translates into jobs and income for the region. It includes the "ripple effect" (also called the "multiplier effect") of changes in economic sectors that may not be directly impacted by management actions, but are linked to industries that are directly impacted. In IMPLAN, these ripple effects are termed indirect impacts (for changes in industries that sell inputs to the industries that are directly affected) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

**Important Wildlife Habitat:**
Big game crucial winter range, big game parturition areas, designated critical migration corridors, sage-grouse breeding and nesting areas, raptor concentration areas, and critical fish spawning areas.

**Integrated Pest Management:**
Ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism.

**Integrated Weed Management:**
The use of all appropriate weed control measures, including fire, as well as mechanical, chemical, biological, and cultural techniques, in an organized and coordinated manner on a site-specific basis.

**Interim Reclamation:**
The short-term goal identified by the Wyoming Reclamation Policy (WY-2012-034) to immediately stabilize disturbed areas and provide conditions necessary to achieve the long term goal.

**Intermittent Stream:**
A stream that flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow in mountainous areas. Confusion over the distinction between intermittent and ephemeral streams may be minimized by applying Meinzer's suggestion that the term "intermittent" be arbitrarily restricted to streams that flow continuously for periods of at least 30 days (Prichard et al. 1998).

**Land Tenure:**
To improve the manageability of the BLM-administered lands and improve their usefulness to the public, the BLM has numerous authorities for "repositioning" lands into a more consolidated pattern, disposing of lands, and entering into cooperative management agreements. These land-pattern improvements are completed primarily through the use of land exchanges, but also through land sales, jurisdictional transfers to other agencies, and through the use of cooperative management agreements and leases. These ownership or jurisdictional changes are referred as "Land Tenure Adjustments."

**Laramide Orogeny:**
The Laramide orogeny (orogeny is the Greek word for mountain building) was a period of mountain building in western North America which began during the Late Cretaceous period, 70 to 80 million years ago, and ended 35 to 55 million years ago. The major feature that was created by this orogeny was the Rocky Mountains, but evidence of this period is found from Alaska to Mexico and as far east as the Black Hills. The phenomenon is named for the Laramie Mountains of eastern Wyoming.

**Leasable Minerals:**
Those minerals or materials subject to lease by the federal government under the Mineral Leasing Act of 1920. They include coal, phosphate, asphalt, sulphur, potassium, and sodium minerals; oil and gas, as well as geothermal resources.

**Locatable Minerals:**
Minerals subject to exploration, development, and disposal by staking mining claims as authorized by the Mining Law of 1872, as amended. This includes deposits of metallic minerals such as gold, silver, and other uncommon materials not subject to lease or sale.

**Major Constraints (Oil and Gas):**
Any stipulations or conditions of approval which may restrict the timing or placement of oil and gas developments and may result in an operator dropping the development proposal. Major constraints include NSOs, areas of overlapping TLS that last more than 6 months, areas closed to surface-disturbing activity, areas where surface-disturbing activity is prohibited, and visual resource management (VRM) Class I areas. Leaseholders have the right to explore, develop, and produce mineral resources from any valid, existing lease, even if the area containing the lease were proposed to be closed to future leasing.

**Major Right-of-Way:**
A Federal Land Policy and Management Act (FLPMA) ROW grant under 43 CFR Par 2800 et seq. which the BLM determines to be a Category 4, 5, or 6 type of authorization under 43 CFR 2804.14.

**Mechanized Travel:**
Moving by means of a mechanical device, such as a bicycle, and not powered by a motor.

**Mineral Materials:**
Materials such as common varieties of sand, stone, gravel, pumice, pumicite, and clay that are not obtainable under the mining or leasing laws, but can be acquired under the Mineral Materials Act of 1947, as amended. Also known as salable minerals.

**Mineral Withdrawal:**
A formal order that withholds federal lands and minerals from entry under the Mining Law of 1872, as amended, and closes the area to mineral location (i.e., staking mining claims) and development.

**Minor Right-of-Way:**
A FLPMA ROW grant under 43 CFR Par 2800 et seq. which the BLM determines to be a Category 1, 2, or 3 type of authorization under 43 CFR 2804.14.

**Mitigation:**
(a) Avoiding the impact altogether by not taking a certain action or parts of an action.

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environments.

**Moderate Constraints (Oil and Gas):**
Any stipulations or conditions of approval which may restrict the timing or placement of oil and gas development, but would not otherwise restrict the overall development. Moderate constraints include all timing restrictions (TLS), controlled surface use, areas where surface-disturbing activity is avoided, and VRM Class II areas.

**Modern Intrusions:**
Modern elements or developments that would be out of character with a historic landscape or resource. Modern intrusions can be visual, audible, or atmospheric. An example of a modern intrusion is a new structure or building that would be visible from a historic trail or site, whose setting is primarily historically intact. It could also include a modern scar on the landscape that would be visible from the trail or site.

**Motorized Use:**
Use of public lands by means of vehicles that are propelled by motors, such as cars, trucks, off-highway vehicles (OHVs), motorcycles, etc.

**Multiple Use Reservoir:**
A human-created lake or pond with a combination of balanced uses, including, but not limited to, recreation, livestock watering, watershed health, and wildlife and fish.

**Native Species Status:**
Native Species Status (NSS) refers to the population status of species native to the area in which their habitats occur. The NSSs are divided into the following categories:

NSS1

- Populations are greatly restricted or declining, extirpation appears possible; or ongoing significant loss of habitat.

NSS2

- Populations are declining, extirpation appears possible; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance.

  OR

- Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; ongoing significant loss of habitat.

NSS3

- Populations are greatly restricted or declining, extirpation appears possible; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance.

  OR

- Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance.

OR

- Species is widely distributed; population status or trends are unknown, but are suspected to be stable; ongoing significant loss of habitat.

NSS4

- Populations are greatly restricted or declining, extirpation appears possible; habitat is stable and not restricted.

  OR

- Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance.

  OR

- Species is widely distributed, population status or trends are unknown, but are suspected to be stable; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance.

  OR

- Populations that are stable or increasing and not restricted in numbers and/or distribution; ongoing significant loss of habitat.

**Natural Fire Regime:**
The general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (National Wildfire Coordinating Group 2003).

**Nature and Purposes:**
The term used to describe the character, characteristics, and Congressional intent for a designated National Trail, including the resources, qualities, values, and associated settings of the areas through which such trails may pass; the primary use or uses of a National Trail; and activities promoting the preservation of, public access to, travel within, and enjoyment and appreciation of National Trails.

**Necessary Tasks:**
Temporary excursions leaving existing vehicular routes are permitted only to accomplish necessary tasks. Necessary tasks are actions that support commercial or industrial uses of public lands, which need to be accomplished by a person or organization seeking or holding authorization from the BLM to build, maintain, or place infrastructure necessary to achieve planning goals and objectives, or exercise valid existing rights. Tasks associated with such activities typically require motorized vehicles to haul materials, tools, and equipment to the project site.

The majority of necessary tasks will occur as a result of a BLM authorization. At the time of project authorization, offices will assume and analyze a level of motorized vehicle use for construction and maintenance. It is feasible that a new road will develop as a result of the exemption, and therefore offices should consider if this new road will be open to the public, only for administrative access, or reclaimed. Additional mitigation measures may be necessary

to reduce motorized vehicle impacts. Mitigation measures pertaining to the necessary task exemption will be included in the terms and conditions, Conditions of Approval, or stipulations. Monitoring and evaluation will be conducted at these known locations.

Sometimes necessary tasks (as defined above) are and will be accomplished without formal written approval or in advance of receiving an authorization. Cross-country OHV travel in these cases is authorized so long as resource damage does not occur. While generally defined, the determination of whether resource damage has occurred is left to the discretion of field managers and law enforcement personnel. For this reason, project proponents are encouraged to contact their local field offices prior to using OHVs cross-country, so as to ensure use will not cause resource damage. In addition, project proponents must notify the BLM in writing when and where cross-country travel has occurred prior to an authorization. This can be done at the application phase, but must occur prior to final authorization.

Other Authorizations and Uses:

It is recognized that in many cases, cross-country motorized vehicle use is the most efficient tool for operators and industry to achieve BLM (Planning/Resource/Statutory) objectives and requirements. Livestock herding, scientific studies, habitat treatments, etc., are all examples of actions that may require cross-country motorized vehicle travel. In these cases, the project proponent is expected to submit a request for exemption from travel management regulations. The request for exemption will contain the following elements:

1. Who? Name of company, individuals, agency, and/or other entities traveling cross-country.
2. Description of proposed action and why the action is necessary to achieve agency objectives?
3. Type of motorized vehicle to be used and description of how the vehicle will be used for the proposed action?
4. A map with specific areas where projected cross-country travel is necessary?
5. Season, frequency, and duration of cross-country travel.
6. Why this action can't be accomplished using nonmotorized conveyances (e.g., horses)?
7. Expected outcome if this authorization is granted? Expected outcome if this authorization is not granted?
8. Methods and measures to minimize resource damage?
9. Other information.

Waivers/authorizations will be conditional upon consistency with Land Use and Activity Level planning decisions and other BLM objectives. The project proponent is encouraged to be as detailed as possible in the application for exception. The BLM will consider an application for exception complete when the information provided is sufficient to facilitate impact analysis, enforcement, monitoring, and evaluation. Project proponents are encouraged to submit the waiver request in tandem with other applications, renewals, or proposals, but the agency will accept the applications at all times. Waiver applications will not be accepted for individuals that are being actively investigated for violation of a OHV rule. Waivers and authorizations will not be granted to individuals who have been convicted of an OHV violation.

Any and all individuals conducting cross-country travel under such a waiver or authorization will carry a copy of the waiver and conditions associated with the waiver. The project proponent associated with the waiver will be required on an annual basis to provide an 'actual

occurrence' report that documents the location (legal description), time, and date of each and all incidents where motorized vehicles were used to travel cross-country or off-road.

Failure to adequately document all occurrence of cross-country or off-road travel will result in termination of the waiver. Upon evaluation and monitoring, if it is determined that unacceptable conditions or resource damage is occurring, the waiver may be revoked. Additionally, if an evaluation shows no increased progress towards objectives and/or requirements (part 2 of the request information) then the waiver can be revoked.

**No Surface Occupancy:**
The term "no surface occupancy" is used in two ways. It is used in one way to define a no surface occupancy (NSO) area where no surface-disturbing activities of any nature or for any purpose would be allowed. For example, construction or the permanent or long-term placement of structures or other facilities for any purpose would be prohibited in an NSO area.

The other way the "no surface occupancy" term is used is as a stipulation or mitigation requirement for controlling or prohibiting selected land uses or activities that would conflict with other activities, uses, or values in a given area. When used in this way, the NSO stipulation or mitigation requirement is applied to prohibit one or more specific types of land and resource development activities or surface uses in an area, while other – perhaps even similar – types of activities or uses (for other purposes) would be allowed. For example, protecting important rock art relics from destruction may require closing the area to the staking of mining claims and surface mining, cross-country vehicle travel, construction or long-term placement of structures or pipelines, powerlines, general purpose roads, and livestock grazing. Conversely, the construction of fences to protect the rock art from vandalism or from trampling or breakage by livestock, an access road or trail, and other visitor facilities to provide interpretation and opportunity for public enjoyment of the rock art would be allowed. Further, if there were interest in development of leasable minerals in the area, leases for oil and gas, coal, and so forth, could be issued with a "no surface occupancy" stipulation or mitigation requirement for the rock art site, which would still allow access to the leasable minerals from adjacent lands and underground. The term "no surface occupancy" has no relationship or relevance to the presence of people in an area.

**Notice-level Operations:**
Non-casual use operations that will disturb 5 acres or less of public lands on which reclamation has not been completed. A notice must be submitted 15 calendar days before exploration is commenced. See casual use and Plan of Operations and 43 CFR 3809.5.

**Objective:**
A description of a desired condition for a resource. Objectives can be quantified and measured and, where possible, have established timeframes for achievement.

**Occupied Lek:**
A lek that has been active during at least one strutting season within the last 10 years.

**Off-highway Vehicle:**
Any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, excluding: (1) any nonamphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle being used for emergency purposes; (3) any vehicle whose use is expressly authorized by the Authorized Officer, or otherwise

officially approved; (4) vehicles in official use; and (5) any combat or combat support vehicle when used in times of national defense emergencies.

**Off-highway Vehicle Management Designations:**

Designations apply to all OHVs regardless of the purposes for which they are being used. Emergency vehicles are excluded. The OHV designation definitions have been developed in cooperation with representatives of the U.S. Forest Service, National Park Service, and the BLM state and field office personnel. The BLM recognizes the differences between OHVs and over-snow vehicles in terms of use and impact. Therefore, travel by over-snow vehicles will be permitted off existing routes and in all open or limited areas (unless otherwise specifically limited or closed to over-snow vehicles) if they are operated in a responsible manner without damaging the vegetation or harming wildlife.

Closed:

Vehicle travel is prohibited in the area. Access by means other than motorized vehicle is permitted. This designation is used if closure to all vehicular use is necessary to protect resources, to ensure visitor safety, or to reduce conflicts.

Open:

Vehicle travel is permitted in the area (both on and off roads) if the vehicle is operated responsibly in a manner not causing, or unlikely to cause, significant undue damage to or disturbance of the soil, wildlife, wildlife habitats, improvements, cultural or vegetative resources, or other authorized uses of the public lands. These areas are used for intensive OHV use where there are no compelling resource needs, user conflicts, or public safety issues to warrant limiting cross-country travel.

Limited:

(a) Vehicle travel is permitted only on roads and vehicle routes which were in existence prior to the date of designation in the *Federal Register*. Vehicle travel off of existing vehicle routes is permitted only to accomplish necessary tasks and only if such travel does not result in resource damage. Random travel from existing vehicle routes is not allowed. Creation of new routes or extensions and/or widening of existing routes are not allowed without prior written agency approval.

(b) Vehicle travel is permitted only on roads and vehicle routes designated by the BLM. In areas where final designation has not been completed, vehicle travel is limited to existing roads and vehicle routes as described above. Designations are posted as follows:

1. Vehicle route is open to vehicular travel.

2. Vehicle route is closed to vehicular travel.

(c) Vehicle travel is limited by number or type of vehicle. Designations are posted as follows:

1. Vehicle route limited to four-wheel drive vehicles only.
2. Vehicle route limited to motorbikes only.
3. Area is closed to over-snow vehicles.

(d) Vehicle travel is limited to licensed or permitted use.

(e) Vehicle travel is limited to time or season of use.

(f) Where specialized restrictions are necessary to meet resource management objectives, other limitations also may be developed.

The BLM may place other limitations, as necessary, to protect other resources, particularly in areas that motorized OHV enthusiasts use intensely or where they participate in competitive events.

**Offsite Mitigation:**
Mitigation located away from the adversely affected site.

**Open:**
Generally denotes that an area is available for a particular use or uses. Refer to specific program definitions found in law, regulations, or policy guidance for application to individual programs.

**Overgrazing:**
Continued heavy grazing that exceeds the recovery capacity of the forage plants and creates deterioration of the grazing lands (Valentine 1990).

**Over-snow Vehicle:**
An over-snow vehicle is a motor vehicle that is designed for use over snow that runs on a track or tracks and/or a ski or skis. An over-snow vehicle does not include machinery used strictly for the grooming of nonmotorized trails.

**Perennial Stream:**
A stream that flows continuously. Perennial streams generally are associated with a water table in the localities through which they flow (Prichard et al. 1998).

**Permitted Use:**
The forage allocated by, or under the guidance of, an applicable land use plan for livestock grazing in an allotment under a permit or lease and expressed in animal unit months.

**Pest:**
With the exception of vascular plants classified as invasive nonnative plant species, a pest can be any biological life form that poses a threat to human or ecological health and welfare. For the purposes of this planning effort, an “animal pest” is any vertebrate or invertebrate animal subject to control by Animal and Plant Health Inspection Service (APHIS). APHIS is currently the BLM’s authorized agent for controlling “animal pests.” For this reason, “animal pests” will be considered a subset of Pest.

**Planned Ignition:**
The intentional initiation of a wildland fire by hand-held, mechanical, or aerial device, where the distance and timing between ignition lines or points and the sequence of igniting them is determined by environmental conditions (weather, fuel, topography), firing technique, and other factors which influence fire behavior and fire effects (see *Prescribed Fire*).

**Planning Area:**
A geographic area for which land use and resource management plans are developed and maintained.

**Plan of Operations:**
Projects disturbing more than 5 acres require an approved Plan of Operations before work can begin. Once a Plan of Operations is filed with the BLM, the proposed action is analyzed and those mitigating measures needed to prevent unnecessary or undue degradation are required for approval. A Plan of Operations must always be filed, regardless of disturbance acreage, for activities which exceed casual use and occur in special management areas such as areas of critical environmental concern, wild and scenic rivers and areas closed to off-road vehicle use. A Plan of Operations is required in wilderness study areas for other than casual use level activities. The non-impairment criteria will determine the required mitigating measures in the Plan of Operations.

**Potential Fossil Yield Classification:**
Geologic units in the planning area are classified according to the Potential Fossil Yield Classification, usually at the formation or member level, according to the probability of yielding resources of concern to land managers, primarily vertebrate fossils. The classification uses a ranking of 1 through 5, with Class 5 assigned to units with a high potential for fossils. Within the planning area, Class 4 and Class 5 geologic formations account for approximately 50 percent of the total acreage, including all ownerships. About 35 percent of public land in the planning area is underlain by Class 4 and Class 5 formations. The classifications are described as below:

Class 1. Igneous and metamorphic geologic units, or units with highly disturbed preservational environments that are not likely to contain recognizable fossil remains. Management concern is negligible for Class 1 resources and mitigation requirements are rare.

Class 2. Sedimentary geologic units that are not likely to contain vertebrate fossils or significant nonvertebrate fossils. Management concern is low for Class 2 resources and mitigation requirements are not likely.

Class 3. Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence, or units of unknown fossil potential. Management concern may extend across the entire range of management. Ground-disturbing activities require sufficient assessment to determine whether significant resources occur in the area of the proposed action.

Class 4. Class 4 units are Class 5 units with a lowered risk of human-caused adverse impacts or lowered risk of natural degradation. Ground-disturbing activities require assessment to determine whether significant resources occur

in the area of the proposed action and whether those actions will impact the resource. Mitigation may include full monitoring of significant localities.

Class 5. Highly fossiliferous geologic units that regularly produce vertebrate fossils or significant nonvertebrate fossils and that are at risk of natural degradation or human-caused adverse impacts. Class 5 areas receive the highest level of management focus. Mitigation of ground-disturbing actions is required and may be intense. Areas of special interest may be designated and intensely managed.

**Potential Natural Community:**
The biotic community that would become established if all successional sequences were completed without interference by humans under the present environmental conditions. Natural disturbances are inherent in development. Potential natural community includes naturalized nonnative species.

**Prairie Dog "Complex":**
Defined as a cluster of two or more prairie dog towns within 3 kilometers of each other (Clark and Stromberg 1987), and bounded by either natural or artificial barriers (Whicker and Detling 1988), which effectively isolate one cluster of colonies from interacting/interchanging with another. Prairie dogs may commonly move among colonies of a cluster, and thereby foster reproductive/genetic viability, but exhibit little emigration/immigration between clusters. A cluster may include some currently unoccupied, through physically suitable (i.e., vegetation, soils, topography, etc.), land immediately adjacent to occupied colonies that support other prairie dog-associated (ecosystem function), obligate or facultative species (e.g., swift fox, mountain plover, burrowing owl, etc.).

**Preference:**
A superior or priority position against others for the purpose of receiving a grazing permit or lease. This priority is attached to base property or controlled by a permittee or lessee.

**Prescribed Burning:**
Controlled application of fire to wildland fuels in either their natural or modified state under specified environmental conditions that allow the fire to be confined to a predetermined area, and at the same time, to produce the fire intensity and rate of spread required to attain planned resource management objectives.

**Prescribed Fire:**
A wildland fire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which National Environmental Policy Act requirements (where applicable) have been met prior to ignition.

**Priority Fish Species:**
Species considered to be sport fish and native species.

**Produced Water:**
Groundwater removed to facilitate the extraction of minerals, such as coal, oil, or gas.

**Proper Functioning Condition:**
The on-the-ground condition of a riparian-wetland area, referring to how well the physical processes are functioning and the state of resiliency that will allow a riparian-wetland area

to hold together during a high-flow event, sustaining that system's ability to produce values related to both physical and biological attributes.

**Proper Grazing:**
Proper grazing is the practice of managing forage use by grazing animals at a sustainable level that maintains rangeland health. Proper grazing will maintain or increase plant cover, including residue, which acts to slow down or reduce runoff, increase water infiltration, and keep erosion and sedimentation at or above acceptable levels within the potential of ecological sites within a given geographic area (e.g., watershed, grazing allotment, etc.).

**Range Improvement Project:**
A structural improvement requiring placement or construction to facilitate management or control distribution and movement of grazing or browsing animals. Such improvements may include, but are not limited to, fences, wells, troughs, reservoirs, water catchments, pipelines, and cattleguards. The project also may include a practice or treatment which improves rangeland condition and or resource production for multiple use. Nonstructural types of projects may include, but are not limited to, seeding and plant control through chemical, mechanical, and biological means or prescribed burning.

**Rangeland:**
Land on which the native vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing. This includes lands revegetated naturally or artificially when routine management of that vegetation is accomplished mainly through manipulation of grazing. Rangelands include natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows.

**Rangeland Health:**
The degree to which the integrity of the soil and ecological processes of rangeland ecosystems are sustained.

**Raptor:**
Bird of prey with sharp talons and a strongly curved beak, such as hawks, falcons, owls, vultures, and eagles.

**Recreational Outcomes:**
The beneficial and non-beneficial consequences (i.e., outcomes) of the management and use of recreation and related amenity resources and programs (Driver 2008).

**Recreational Use:**
The public is allowed to pursue recreational (e.g., picking up big game kills, camping, parking) activities up to 300 feet away from roads and trails, as long as such activities do not cause resource damage or create new roads or extend existing roads. The existing road system and this cross-country travel allowance is designed to accommodate the needs of recreational activities on the public lands. This applies only to all "Limited" travel designations.

**Recreation Management Areas:**
Recreation management areas are classified as either Special Recreation Management Areas (SRMAs) or ERMAs. The recreation management areas are land units where Recreation and Visitor Services objectives are recognized as a primary resource management consideration, and specific management is required to protect the recreation opportunities. The recreation management area designation is based on recreation demand and issues, recreation setting

characteristics, resolving use/user conflicts, compatibility with other resource uses, and resource protection needs (BLM Instruction Memorandum 2011-004 [BLM 2011c]).

Extensive Recreation Management Areas: Administrative units that require specific management consideration to address recreation use, demand, or Recreation and Visitor Services program investments. ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Management of ERMAs is commensurate with management of other resources and resource uses.

Special Recreation Management Areas: Administrative units where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and/or distinctiveness, especially compared to other areas used for recreation. The SRMAs are managed to protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics. SRMAs may be subdivided into recreation management zones (RMZs) to further delineate specific recreation opportunities.

**Responsible Official:**
The BLM official who has been delegated authority to approve an action by signing a Record of Decision in the matter of an Environmental Impact Statement, or Decision Records in the matter of an Environmental Assessment.

**Restricted Disposal:**
Parcels identified for restricted disposal may be disposed of under the Recreation and Public Purposes Act, by exchange, may limit the disposal to a particular type of entity capable of preserving the resource values, or may include the use of covenants in the deed or land sale patent to ensure the resource values are protected.

**Retirement:**
Ending livestock grazing on a specific area of land.

**Rights-of-Way:**
A ROW grant is an authorization to use a specific piece of public land for a specific project, such as roads, pipelines, transmission lines, and communication sites. The grant authorizes rights and privileges for a specific use of the land for a specific period of time.

**Rights-of-Way Avoidance Areas:**
Areas where adverse routing factors exist. ROWs either will not be granted in these areas, or, if granted, will be subject to stringent terms and conditions. In other words, ROWs would be restricted (but not necessarily prohibited) in these avoidance areas (see BLM Manuals 2800 and 2880).

**Rights-of-Way Exclusion Area:**
Areas with sensitive resource values where ROW and 302 permits, leases, and easements would not be authorized (see BLM Manuals 2800 and 2880).

**Riparian Areas:**
Riparian areas are a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with

perennially and intermittently flowing rivers and streams, glacial potholes, playas, and the shores of lakes and reservoirs with stable water levels, are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil.

**Riparian-Wetland Functionality Classification:**

Functional At-Risk: Riparian-wetland areas that are in functional condition, but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

Proper Functioning Condition (PFC): A riparian or wetland area is considered to be in PFC when adequate vegetation, landform, or large woody debris is present to do the following:

- Dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality.
- Filter sediment, capture bedload, and aid floodplain development.
- Improve floodwater retention and groundwater recharge.
- Develop root masses that stabilize stream banks against cutting action.
- Develop diverse ponding and channel characteristics to provide the habitats and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses.
- Support greater biodiversity.

Nonfunctional: Riparian or wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, and so on, as listed above. The absence of certain physical attributes, such as a floodplain where one should be, are indicators of nonfunctioning conditions.

Unknown: Riparian or wetland areas that the BLM lacks sufficient information on to make any form of determination.

**Salable Minerals:**
See *Mineral Materials*.

**Seasonal Ranges:**
The Wyoming Game and Fish Department has identified various ranges for big game species. These ranges are defined as follows:

Summer or Spring-Summer-Fall: A population or portion of a population of animals use the documented habitats within this range annually from the end of previous winter to the onset of persistent winter conditions.

Severe Winter Relief: A documented survival range, which may or may not be considered a crucial range area as defined above. It is used to a great extent, but

only in extremely severe winters. It may lack habitat characteristics that would make it attractive or capable of supporting major portions of the population during normal years, but is used by and allows at least a significant portion of the population to survive the occasional extremely severe winter.

Winter: A population or portion of a population of animals annually use the documented suitable habitat sites within this range in substantial numbers during the winter period only.

Winter/Year-long: A population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges.

Year-long: A population or substantial portion of a population of animals makes general use of the suitable documented habitat sites within the range on a year-round basis. On occasion, animals may leave the area under severe conditions.

Parturition Areas: Documented birthing areas commonly used by females. They include calving areas, fawning areas, and lambing grounds. These areas may be used as nurseries by some big game species.

**Section 106 of National Historic Preservation Act:**

"The head of any federal agency having direct or indirect jurisdiction over a proposed federal or federally assisted undertaking in any state and the head of any federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places. The head of any such federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking" (16 United States Code 47 df).

**Sensitive Sites or Resources:**

Sensitive sites or resources refer to significant cultural resources that are, or may be eligible, for nomination to the National Register of Historic Places.

**Sensitive Species:**

Species designated as sensitive by the BLM State Director include species that are under status review, have small or declining populations, live in unique habitats, or require special management. BLM Manual 6840 provides policy and guidance for special status species management. The BLM Wyoming Sensitive Species Policy and List are provided in a memorandum updated annually. Primary goals of the BLM Wyoming policy include maintaining vulnerable species and habitat components in functional BLM ecosystems and preventing a need for species listing under the Endangered Species Act.

**Seral Stage:**

One of a series of plant communities that follows another in time on a specific ecological site.

**Setting:**
Setting is the physical environment of a historic property and how the property evokes a sense of feeling and association with past events. Accordingly, setting refers to the character of the place in which the property played its historic role. It involves how, not just where, the property is situated and its relationship to surrounding features and open space. These features and their relationships should be considered not only within the exact boundaries of the property, but also between the property and its surroundings.

**Special Recreation Management Areas:**
Administrative units where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation. The SRMAs are managed to protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics. SRMAs may be subdivided into RMZs to further delineate specific recreation opportunities.

**Special Status Species:**
Special status species are species proposed for listing, officially listed as threatened or endangered, or are candidates for listing as threatened or endangered under the provisions of the Endangered Species Act; those listed by a state in a category such as threatened or endangered, implying potential endangerment or extinction; and those designated by the State Director as sensitive (BLM 2008e).

**Split-estate:**
Surface land and mineral estate of a given area under different ownerships. Frequently, the surface will be privately owned and the minerals federally owned.

**Standards for Healthy Rangelands:**
A description of the physical and biological conditions or degree of function required for healthy, sustainable lands (e.g., land health standards).

**State-listed Species:**
Species proposed for listing or listed by a state in a category implying, but not limited to, potential endangerment or extinction. Listing is either by legislation or regulation.

**Surface-disturbing Activities (or Surface Disturbance):**
The physical disturbance and movement or removal of land surface and vegetation. These activities range from the very minimal to the maximum types of surface disturbance associated with such things as OHV travel or use of mechanized, rubber-tired, or tracked equipment and vehicles; some timber cutting and forest silvicultural practices; excavation and development activities associated with use of heavy equipment for road, pipeline, powerline and other types of construction; blasting; strip, pit, and underground mining and related activities, including ancillary facility construction; oil and gas well drilling and field construction or development and related activities; range improvement project construction; and recreation site construction.

**Surface Water Classes and Uses:**
The following water classes are a hierarchical categorization of waters according to existing and designated uses. Except for Class 1 waters, each classification is protected for its specified uses plus all the uses contained in each lower classification. Class 1 designations are based on value determinations rather than use support and are protected for all uses in existence at

the time of or after designation. There are four major classes of surface water in Wyoming with various subcategories within each class.

(a) Class 1, Outstanding Waters. Class 1 waters are those surface waters in which no further water quality degradation by point source discharges other than from dams will be allowed. Nonpoint sources of pollution shall be controlled through implementation of appropriate best management practices. Pursuant to Section 7 of these regulations, the water quality and physical and biological integrity that existed on the water at the time of designation will be maintained and protected. In designating Class 1 waters, the Environmental Quality Council shall consider water quality, aesthetic, scenic, recreational, ecological, agricultural, botanical, zoological, municipal, industrial, historical, geological, cultural, archeological, fish and wildlife, the presence of substantial quantities of developable water, and other values of present and future benefit to the people.

(b) Class 2, Fisheries and Drinking Water. Class 2 waters are waters, other than those designated as Class 1 that are known to support fish or drinking water supplies or where those uses are attainable. Class 2 waters may be perennial, intermittent, or ephemeral and are protected for the uses indicated in each subcategory listed below. Five subcategories of Class 2 waters exist.

(c) Class 3, Aquatic Life Other than Fish. Class 3 waters are waters other than those designated as Class 1 that are intermittent, ephemeral, or isolated waters, and because of natural habitat conditions, do not support nor have the potential to support fish populations or spawning or certain perennial waters that lack the natural water quality to support fish (e.g., geothermal areas). Class 3 waters provide support for invertebrates, amphibians, or other flora and fauna that inhabit waters of the state at some stage of their life-cycles. Uses designated on Class 3 waters include aquatic life other than fish, recreation, wildlife, industry, agriculture, and scenic value. Generally, waters suitable for this classification have wetland characteristics; and such characteristics will be a primary indicator used in identifying Class 3 waters. There are four subcategories of Class 3 waters.

(d) Class 4, Agriculture, Industry, Recreation, and Wildlife. Class 4 waters are waters other than those designated as Class 1 where it has been determined that aquatic life uses are not attainable pursuant to the provisions of Section 33 of these regulations. Uses designated on Class 4 waters include recreation, wildlife, industry, agriculture and scenic value (Wyoming DEQ No Date-b).

**Suspension:**

The temporary witholding from active use, through a decision issued by the authorized officer or by agreement, of part or all, of the permitted use in a grazing permit or lease.

**Type E Fence:**

Identified as a wildlife-friendly fence type that more effectively accommodates wildlife passage than other traditional fence types. Four-wire construction allows most wildlife species to pass over or under the fence and provides adequate containment for livestock.

**Unique Forest and Woodland Communities:**
Forest and woodland habitats recognized as significant for at least one factor such as density, diversity, size, public interest, remnant character, age, or having limited distribution throughout the planning area.

**Utilization Levels:**
The proportion or degree of current year's forage production that is consumed or destroyed by animals (including insects). It may refer either to a single plant species, a group of species, or to the vegetation as a whole, generally expressed as a percentage.

**Vegetative Diversity:**
The variety of vegetative types in an area, including species, the genetic differences among species and populations, the communities and ecosystems in which vegetation types occur, and the structure and seral stage of these communities. Vegetative diversity includes rare, as well as common vegetative types, and typically supports a diverse array of animal species and communities.

**Viewshed:**
Viewshed is used in VRM to describe "… landscape that can be seen under favorable atmospheric conditions from a viewpoint (key observation point) or along a transportation corridor" (BLM 1984).

**Visual Resource Management Classes:**

Class I. The objective of this class is to maintain a landscape setting that appears unaltered by humans. It is applied to wilderness areas, some natural areas, wild portions of wild and scenic rivers, and other similar situations in which management activities are to be restricted.

Class II. The objective of this class is to design proposed alterations so as to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III. The objective of this class is to design proposed alterations so as to partially retain the existing character of the landscape. Contrasts to the basic elements (form, line, color, and texture) caused by a management activity may be evident and begin to attract attention in the characteristic landscape; however, the changes should remain subordinate to the existing characteristic landscape.

Class IV. The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. Contrasts may attract attention and be a dominant feature of the landscape in terms of scale; however, changes should repeat the basic elements (form, line, color, and texture) inherent in the characteristic landscape.

Rehabilitation Area. Change is needed or change may add acceptable visual variety to an area. This class applies to areas where the naturalistic character

has been disturbed to a point at which rehabilitation is needed to bring it back into character with the surrounding landscape. This class would apply to areas identified in the scenic evaluation where the quality class has been reduced because of unacceptable cultural modification. The contrast is inharmonious with the characteristic landscape. It may also be applied to areas that have the potential for enhancement; i.e., add acceptable visual variety to an area or site. It should be considered an interim or short-term classification until one of the other VRM Class objectives can be reached through rehabilitation or enhancement. The desired VRM class should be identified.

**Visual Resources:**
The visible physical features of a landscape (topography, water, vegetation, animals, structures, and other features) that constitute the scenery of an area.

**Waiver:**
A permanent exemption of a stipulation.

**Wetlands:**
Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and which, under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. BLM Manual 1737, Riparian-Wetland Area Management, includes marshes, shallow swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, and riparian areas as wetlands.

**Wildfire:**
An unplanned ignition of a wildland fire (such as a fire caused by lightning, volcanoes, unauthorized and accidental human-caused fires) and escaped prescribed fires.

**Wildland Fire:**
A general term describing any non-structure fire that occurs in the wildland.

**Wildland Industrial Interface:**
The area where industrial development meets or intermingles with undeveloped wildland.

**Wildland-Urban Interface:**
The Healthy Forest Recreation Act 2003 defines wildland urban interface (Section 101) as an area within or adjacent to an at risk community that has been identified by a community in its wildfire protection plan or, for areas that do not have such a plan, an area extending; (1) ½ mile from the boundary of an at risk community, or; (2)1½ miles when other criteria are met. (e.g., a sustained steep slope or a geographic feature aiding in creating an effective fire break or is condition class III land, or; (3) is adjacent to an evacuation route.

**Wildlife-disturbing Activity:**
BLM-authorized activities other than routine maintenance that may cause displacement of or excessive stress to wildlife during critical life stages. Wildlife-disturbing activities include human presence, noise, and activities using motorized vehicles or equipment.

**Wind River Indian Reservation:**
Indian reservation shared by the Eastern Shoshone and Northern Arapaho tribes of Native Americans in the central western portion of Wyoming. It is the seventh-largest Indian reservation by area in the United States, encompassing a land area of 3,473.272 square miles. It encompasses just over one-third of Fremont County and over one-fifth of Hot Springs

County, and the reservation is located in the Wind River Basin, surrounded by the Wind River Mountain Range, Owl Creek Mountains, and the Absaroka Mountains.

**Withdrawal:**

Removal or withholding of public lands, by statute or Secretarial order, from operation of some or all of the public land laws. A mineral withdrawal includes public lands potentially valuable for leasable minerals, precluding the disposal of the lands except with a mineral reservation clause, unless the lands are found not to contain a valuable deposit of minerals. A mineral withdrawal is the closing of an area to mineral location and development activities.

**Yellowcake:**

Yellowcake is the product of the uranium extraction (milling) process. Early production methods resulted in a bright yellow compound, hence the name yellowcake. The material is a mixture of uranium oxides that can vary in proportion and color from yellow to orange to dark green (blackish), depending at which temperature the material was dried (level of hydration and impurities). Higher drying temperatures produce a darker, less soluble material. Yellowcake is commonly referred to as $U_3O_8$ and is assayed as pounds $U_3O_8$ equivalent. This fine powder is packaged in drums and sent to a conversion plant that produces uranium hexafluoride as the next step in the manufacture of nuclear fuel.

# Appendix A. Federal Laws, Regulations, Policies, Guidance, and Other Applicable Mandates and Authority

**Table A.1. Federal Laws and Statutes**

| Federal Law or Statute | Year |
|---|---|
| Independent Offices Appropriation Act of 1952 (31 United States Code [U.S.C.] 9701) | 1952 |
| American Indian Religious Freedom Act (42 U.S.C. 1996) | 1978 |
| Antiquities Act (Public Law [P.L.] 59-209; 34 Stat. 225; 16 U.S.C. 431-433) | 1906 |
| Archeological Resources Protection Act (P.L. 96-95; 93 Stat. 721; 16 U.S.C. 47Oaa et seq.) as amended (P.L. 100-555; P.L. 100-588) | 1979 |
| Archeological and Historic Preservation Act (16 U.S.C. 469-469c-1, P.L. 86-523, 74 Stat. 220, 88 Stat. 174) | 1974 |
| Archeological and Paleontological Salvage for Federal Highway Projects (23 U.S.C. 305; 72 Stat. 913 [1958], 74 Stat. 525 [1960]) | 1960 |
| Bald Eagle Protection Act (16 U.S.C. 668-668d, 54 Stat. 250) | 1940 |
| Carlson-Foley Act of 1968 (42 U.S.C. 1241-1243) | 1968 |
| Clean Air Act (42 U.S.C. 7401–7626, P.L. 159), as amended (P.L. 108–201) | 1970 |
| Coastal Zone Management Act (P.L. 92-583, 16 U.S.C. 1451-1456) | 1972 |
| Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601) | 1980 |
| Department of the Interior Secretarial Order 3226 | 2001 |
| Desert Land Act (19 Stat. 377; 43 U.S.C. 321-323), as amended | 1877 |
| Domestic Minerals Program Extension Act | 1953 |
| Economy Act 1932 (P.L. 72-211; 47 Stat. 417; 31 U.S.C. 686), as amended | 1932 |
| Emergency Planning and Community Right-to-Know Act (42 U.S.C. 11001-11050) | 1986 |
| Emergency Wetland Resources Act | 1986 |
| Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884), as amended | 1973 |
| Energy Independence and Security Act | 2007 |
| Energy Policy Act (P.L. 109–58) | 2005 |
| Executive Order 11514 – Protection and Enhancement of Environmental Quality | 1970 |
| Executive Order 11593 – Protection and Enhancement of the Cultural Environment | 1971 |
| Executive Order 11644 – Use of Off-Road Vehicles on the Public Lands | 1972 |
| Executive Order 11738 – Providing for administration of the Clean Air Act and the Federal Water Pollution Control Act with respects to federal contracts, grants, or loans | 1973 |
| Executive Order 11987 – Exotic organisms | 1977 |

| Federal Law or Statute | Year |
|---|---|
| Executive Order 11988 – Floodplain Management | 1977 |
| Executive Order 11989 – Off-Road Vehicles on Public Lands | 1977 |
| Executive Order 11990 – Protection of Wetlands | 1977 |
| Executive Order 11991 – Relating to protection and Enhancement of Environmental Quality | 1977 |
| Executive Order 12088 – Federal Compliance with Applicable Pollution Control | 1978 |
| Executive Order 12580 – Superfund Implementation and 13016 – Amendment to Executive Orders 12580 | 1987, 1996 |
| Executive Order 13007 – Indian Sacred Sites | 1996 |
| Executive Order 13084 – Consultation and Coordination with Indian Tribal Governments | 1998 |
| Executive Order 13112 – Invasive Species | 1999 |
| Executive Order 13148 – Greening of the Government through Leadership in Environmental Management | 2000 |
| Executive Order 13195 – Trails for America in the 21st Century | 2001 |
| Executive Order 13212 – Actions to Expedite Energy-Related Projects | 2003 |
| Executive Order 13287 – Preserve America | 2003 |
| Executive Order Public Water Reserve 107 | 1926 |
| Executive Order 10355 – Designating the Provisional Intergovernmental Committee for the movement of migrants from Europe as a public international organization entitled to enjoy certain privileges, exemptions, and immunities | 1952 |
| Executive Order 13175 – Consultation and Coordination with Indian Tribal Governments | 2000 |
| Executive Order 6910 and Executive Order 6964, and amendments | 1934 |
| Federal Aid Highway Act (23 U.S.C. 107[d] and 317) | 1958 |
| Federal Cave Resources Protection Act (16 U.S.C. 4301-4309) | 1988 |
| Federal Coal Leasing Amendments Act (90 Stat. 1083-1092), as amended | 1976 |
| Federal Coal Management Program Coal Screening Process (43 Code of Federal Regulations [CFR] 3420.1-4) | 1997 |
| Federal Facilities Compliance Act of 1992 | 1992 |
| Federal Land Policy and Management Act | 1976 |
| Federal Land Recreation Enhancement Act | 2004 |
| Federal Land Transaction Facilitation Act (43 U.S.C. 2301, et seq.) | 2000 |
| Federal Noxious Weed Act of 1974, as amended (7 U.S.C. 2801 et seq.) | 1974 |
| Federal Oil and Gas Royalty Management Act | 1982 |
| Federal Plant Pest Act (7 U.S.C. 150aa et seq.) | 1957 |
| Federal Property and Administrative Services Act of 1949 | 1949 |
| Federal Water Pollution Control Act (33 U.S.C. 1251-1376), as amended | 1948 |
| Federal Water Projects Recreation Act 916 U.S.C 460[L][12]-460[L][21]), as amended | 1965 |
| Fish and Wildlife Coordination Act of 1934 (16 U.S.C. 661-667e), as amended | 1934 |

| Federal Law or Statute | Year |
|---|---|
| Fish and Wildlife Conservation Act (16 U.S.C. 2901-2911) | 1980 |
| Food Security Act of 1985 (16 U.S.C. 3801-3862) | 1985 |
| General Allotment Act, Section 4 (25 U.S.C. 334), as amended | 1887 |
| General Mining Law of 1872, as amended | 1872 |
| Healthy Forests Restoration Act (P.L. 108-148) | 2003 |
| Historic Sites Act of 1935 (16 U.S.C. 461 et seq.) | 1935 |
| Lacey Act (18 U.S.C. 42), as amended | 1988 |
| Land & Water Conservation Act (16 U.S.C. 4601-4), as amended | 1965 |
| Lode Law Act of 1866 (14 Statute 251) | 1866 |
| Migratory Bird Conservation Act of 1929 (16 U.S.C. 715-715r) | 1929 |
| Migratory Bird Treaty Act of 1918 (16 U.S.C. 703 et seq.) | 1918 |
| Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 et seq.) | 1920 |
| Mineral Leasing Act for Acquired Lands of 1947, as amended (30 U.S.C. 351 et seq.) | 1947 |
| Mining and Mineral Policy Act of 1970 (30 U.S.C. 181 et seq.) | 1970 |
| Mining Claim Rights Restoration Act (30 U.S.C. 621-625) | 1955 |
| National Environmental Policy Act | 1969 |
| National Fire Plan | 2000 |
| National Historic Trails System Act (16 U.S.C. 1241-1249), as amended | 1968 |
| National Historic Preservation Act of 1966 (16 U.S.C. 470) | 1966 |
| National Materials and Minerals Policy, Research and Development Act of 1980 (P. L. 96-479, 94 Stat. 2305) | 1980 |
| National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300) | 1998 |
| National Parks and Recreation Act of 1978 (16 U.S.C. 1242 and 1243) | 1978 |
| National Trails System Act of 1968 (16 U.S.C. 1241 et seq.), as amended | 1968 |
| National Wild & Scenic Rivers Act (16 U.S.C. 1271 et seq.) | 1968 |
| Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 et seq.) | 1990 |
| Neotropical Migratory Bird Conservation Act (P.L. 106-247) | 2000 |
| Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990 (16 U.S.C. 4701 et seq.), as amended | 1990 |
| Noxious Weed Control Act of 2004 (P.L. 108-412) | 2004 |
| O&C Lands Act of 1937 (62 Stat. 162) | 1948 |
| Occupational Safety and Health Act (29 U.S.C. 651 et seq.) | 1970 |
| Oil Pollution Act (33 U.S.C. 2701 et seq.) | 1990 |
| Omnibus Public Land Management Act (P.L. 111-11) | 2009 |
| Plant Protection Act (7 U.S.C. 7701-7772) | 2000 |
| Pollution Prevention Act (42 U.S.C 13101) | 1990 |
| Public Range Improvement Act (43 U.S.C. 1901 et seq.) | 1978 |

| Federal Law or Statute | Year |
|---|---|
| Public Rangelands Improvement Act of 1978 (43 U.S.C. 1901 et seq.) | 1978 |
| The Recreation and Public Purposes Act (43 U.S.C. 869), as amended in 1988 | 1926 |
| Reorganization Plan No. 3 of 1946 (5 U.S.C. Section 402) | 1946 |
| Reservoir Salvage Act of 1960 (16 U.S.C. 469), as amended by Archeological and Historic Preservation Act of 1974 | 1960 |
| Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901 et seq.), as amended, and the Bevill Amendment (Section 3001[b][3][A][ii] and 40 CFR 261.4[b][7]) | 1976 |
| Riparian-Wetlands Initiative for the 1990s, U.S. Department of the Interior, Bureau of Land Management, January 22, 1992 | 1992 |
| Rivers and Harbors Act of 1899 (10 U.S.C. 1899, Section 10) | 1899 |
| Safe Drinking Water Act (L. 95-190; 42 U.S.C. 201, 300 et seq.), as amended | 1977 |
| San Juan Basin Wilderness Protection Act of 1984 (16 U.S.C. § 1132) | 1984 |
| National Historic Preservation Act of 1966 (16 U.S.C. 470) | 1966 |
| Sikes Act of 1974, as amended (16 U.S.C. 670 et seq.) | 1974 |
| Soil and Water Resources Conservation Act of 1977 (16 U.S.C. 2001 et seq.) | 1977 |
| Soil Conservation and Domestic Allotment Act of 1935 (16 U.S.C. 590), as amended | 1935 |
| Soil Information Assistance for Community Planning and Resource Development Act of 1966 (42 U.S.C. 3271) | 1966 |
| Stock Raising Homestead Act of 1916 (43 U.S.C. 299), as amended | 1916 |
| Surface Mining Control and Reclamation Act (30 U.S.C. 1201 et seq.) | 1977 |
| Surface Resources Act of 1955 (30 U.S.C. 611-614) | 1955 |
| The Airport and Airway Improvement Act, Section 516 (49 U.S.C. 2215) | 1982 |
| The Department of Energy Organization Act (42 U.S.C. 7101 et seq.) | 1977 |
| The Engle Act (43 U.S.C. 155 et seq.) | 1958 |
| The Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.), as amended | 1970 |
| The Land and Water Conservation Fund (43 U.S.C. 460 et seq.) | 1965 |
| The Mining and Minerals Policy Act of 1970 | 1970 |
| The Multiple Mineral Development Act (30 U.S.C. 521-531 et seq.) | 1954 |
| The Wilderness Act of 1964 (16 U.S.C. 1131), as amended | 1964 |
| Toxic Substance and Control Act of 1976 (P.L. 104-66), as amended in 1995 | 1976 |
| Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management | 2000 |
| U.S. Onshore Orders | |

| Federal Law or Statute | Year |
|---|---|
| Onshore Order No. 1 – Approval of Operations on Onshore Federal and Indian Oil and Gas Leases | 1983 |
| Onshore Order No. 2 – Onshore Oil and Gas Drilling Operations on Federal and Indian Oil and Gas Leases | 1988 |
| Onshore Order No. 3 – Site Security on Federal Oil and Gas Leases | 1989 |
| Onshore Order No. 4 – Measurement of Oil on Federal Oil and Gas Leases | 1989 |
| Onshore Order No. 5 – Measurement of Gas on Federal Oil and Gas Leases | 1989 |
| Onshore Order No. 6 – Hydrogen Sulfide Operations on Federal Oil and Gas Leases | 1991 |
| Onshore Order No. 7 – Disposal of Produced Water from Federal Oil and Gas Leases | 1993 |
| Water Quality Act of 1987, as amended from the Federal Water Pollution Control Act of 1977 (Clean Water Act) (33 U.S.C. 1251 et seq.), as amended | 1987 |
| Water Resources Development Act | 1974 |
| Water Resources Planning Act (42 U.S.C. 1962a-1962[a][4][e]), as amended | 1965 |
| Watershed Protection and Flood Protection Act (16 U.S.C. 1001 et seq.), as amended | 1954 |
| Watershed Restoration and Enhancement Agreements (“Wyden Amendment”) (P.L.-104-208, Sec. 124, P.L. 10-5-277, Sec. 136 of the 1999 Interior Appropriations Act of 1998) | 1998 |
| Wild and Free Roaming Horse and Burro Act (P.L. 92-195) | 1971 |
| Wild and Scenic Rivers Act (16 U.S.C. 1271 et seq.) | 1968 |
| Federal Wildland Fire Management Policy | 2001 |
| U.S. V. Peck, No. 97-8122, 1999 WL 33022 | 1999 |
| Placer Law – Act of July 9, 1870 (16 Stat. 217) | 1870 |
| Carey Act of August 18, 1894 (43 U.S.C. 641 et seq.), as amended | 1894 |
| Earl Douglass, 44 L.D. 325, August 6, 1915 | 1915 |
| Act of April 23, 1932; 47 Stat. 136 | 1932 |
| The Act of June 28, 1934; Section 7 (43 U.S.C. 315f), as amended | 1934 |
| The Materials Act of July 31, 1947 (30 U.S.C. 601-604), as amended | 1947 |
| Acquired Lands Act – Act of August 7, 1947; 61 Stat. 913 | 1947 |
| Act of September 1, 1949, Section 3 (30 U.S.C. 192c) | 1949 |
| Act of June 30, 1950 (16 U.S.C. 508[C] and [e]) | 1950 |
| Act of August 13, 1954 (68 Stat. 708, 30 U.S.C. 521 subpart) | 1954 |
| Multiple Mineral Development Act of August 13, 1954 (30 U.S.C. 521-531 et seq.) | 1954 |
| Act of July 23, 1955 (P.L. 167; 43 CFR 3710) | 1955 |
| Act of September 28, 1962 (P.L. 87-713, 76 Stat. 652) | 1962 |
| Classification and Multiple Use Act of September 19, 1964 (78 Stat. 986, 43 U.S.C. 1411-18) | 1964 |

| Federal Law or Statute | Year |
|---|---|
| Act of October 30, 1978 (92 Stat. 2073-2075) | 1978 |
| Naval Petroleum Reserves Production Act (43 CFR 2361.1[f]) | 1976 |

## Table A.2. Bureau of Land Management Regulations and Policies

| Bureau of Land Management Directive | Year |
|---|---|
| Abandoned Mine Lands National Strategic Plan | 2006 |
| Applications for Permit to Drill Fees | 2007 |
| Applications for Permits to Drill | 2007 |
| Best Management Practices – "The Gold Book" | 2007 |
| Bureau of Land Management (BLM) 3809 Manual (1985, revised 2001) | 2001 |
| BLM Handbook (Draft) H-2101-5 – Environmental Site Assessments for Disposal of Real Property | 2004 |
| BLM Handbook 2200-1, Land Exchange Handbook | 2005 |
| BLM Handbook 3809 (Draft 2006) | 2006 |
| BLM Handbook H-1112-2, Safety and Health for Field Operations Manual | 1998 |
| BLM Handbook H-1601-1, Land Use Planning | 2005 |
| BLM Handbook H-1703-1, Response Actions NCP/Comprehensive Environmental Response, Compensation, and Liability Act | 2001 |
| BLM Handbook H-1742-1, Burned Area Emergency Stabilization and Rehabilitation Handbook | 2007 |
| BLM Handbook H-1745-1, Native Plant Materials Handbook | 2001 |
| BLM Handbook H-1790-1, National Environmental Policy Act | 2008 |
| BLM Handbook H-2101-4, Pre-Acquisition Environmental Site Assessments | 2000 |
| BLM Handbook H-3510-1, Phosphate Leasing Handbook | 1989 |
| BLM Handbook H-3042-1, Solid Minerals Reclamation Handbook | 1992 |
| BLM Handbook H-3720-1, Abandoned Mine Land Program Policy | 2007 |
| BLM Handbook H-3809-1, for Mineral Examiners, v. 3-332, Sept. 11, 2007 | 2007 |
| BLM Handbook H-3809-3, Validity Mineral Reports, June 1969 | 1969 |
| BLM Handbook H-4180-1, Rangeland Health Standards | 2001 |
| BLM Handbook H-4700-1, Wild Horses and Burros Management Handbook | 2010 |
| BLM Handbook H-8160-1, General Procedural Guidance for Native American Consultation | 1994 |
| BLM Handbook H-8270-1, General Procedural Guidance for Paleontological Resource Management | 1998 |
| BLM Handbook H-8342, Travel and Transportation Handbook | 2012 |
| BLM Handbook H-8550-1, Interim Management Policy for Lands Under Wilderness Review | 1987 |
| BLM Handbook H-9214-1, Prescribed Fire Management Handbook | 1998 |

| Bureau of Land Management Directive | Year |
|---|---|
| BLM Information Bulletin No. Washington Office (WO)-2002-101, Cultural Resource Considerations in Resource Management Plans | 2002 |
| BLM Instruction Memorandum No. 2008-009, Potential Fossil Yield Classification System for Paleontological Resources on Public Lands | 2007 |
| BLM Instruction Memorandum No. WO-2003-147, Application for Permit to Drill – Process Improvement #3 – Cultural Resources | 2003 |
| BLM Instruction Memorandum No. WO-2005-003, Cultural Resources and Tribal Consultation for Fluid Minerals Leasing | 2005 |
| BLM Instruction Memorandum No. WO-2005-227, National Historic Preservation Act Section 106 and Oil and Gas Permitting | 2005 |
| BLM Instruction Memorandum No. WO-99-039, Issuance of Grazing Permits in Compliance with Applicable Laws, Regulations and Policy | 1999 |
| BLM Instruction Memorandum No. WY-97-111, Report of Conformance of BLM Land Use Plans with the Standards & Guidelines on the Public Lands; Follow-up Maintenance of Land Use Plans | 1997 |
| BLM Instruction Memorandum No. WY-98-061, Guidance for Water Quality Assessment and Monitoring for the Implementation of Standard Number five of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing | 1998 |
| BLM Instruction Memorandum No. WY-99-20, Complying with Section 106 in Conformance with WOIM No. 99-039 | 1999 |
| BLM Instruction Memorandum No. WO-2003-147, Application for Permit to Drill – Process Improvement #3 – Cultural Resources | 2003 |
| BLM Instruction Memorandum No. WO-2005-003, Cultural Resources and Tribal Consultation for Fluid Minerals Leasing | 2005 |
| BLM Instruction Memorandum No. WO-2005-227, National Historic Policy Act Section 106 and Oil and Gas Permitting | 2005 |
| BLM Instruction Memorandum No. WO-99-039, Issuance of Grazing Permits in Compliance with Applicable Laws, Regulations and Policy | 1999 |
| BLM Instruction Memorandum No. WY-2005-046, Conservation Measures and Best Management Practices for the Management of Potential Gray Wolf Habitat | 2005 |
| BLM Instruction Memorandum No. WY-2005-058, Conservation Measures and Best Management Practices for the Management of Potential Canada Lynx Habitat | 2005 |
| BLM Instruction Memorandum No. WY-2006-037, Conservation Measures and Best Management Practices for the Management of Potential Black-footed Ferret Habitat | 2006 |
| BLM Instruction Memorandum No. WY-2006-049, Conservation Measures and Best Management Practices for the Management of Grizzly Bear Habitat | 2006 |

| Bureau of Land Management Directive | Year |
|---|---|
| BLM Instruction Memorandum No. WY-2006-197, BLM Energy and Non-Energy Mineral Policy | 2006 |
| BLM Instruction Memorandum No. WY-2007-018, Conservation Measures and Best Management Practices for the Management of Mountain Plover Habitat | 2007 |
| BLM Instruction Memorandum No. WY-2010-013, Oil and Gas Leasing Screen for Greater Sage-Grouse | 2010 |
| BLM Instruction Memorandum No. WY-2010-012, Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands including the Federal Mineral Estate | 2009 |
| BLM Instruction Memorandum No. WY-2012-019, Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management Administered Public Lands including the Federal Mineral Estate | 2012 |
| BLM Instruction Memorandum No. 1999-076, Policy on the Use of Certified Weed-Free Hay, Straw, and Mulch on BLM Lands | 1999 |
| BLM Instruction Memorandum No. 2002-164, Guidance to Address Environmental Justice in Land Use Plans | 2002 |
| BLM Instruction Memorandum No. 2006-073, Weed-Free Seed Use on Lands Administered by the Bureau of Land Management | 2006 |
| BLM Instruction Memorandum No. 2007-097, Solar Energy Development Policy | 2007 |
| BLM Instruction Memorandum No. 2009-011, Assessment and Mitigation of Potential Impacts to Paleontological Resources | 2008 |
| BLM Instruction Memorandum No. 2009-018, Process for Setting Priorities for Issuing Grazing Permits and Leases | 2008 |
| BLM Instruction Memorandum No. 2009-043, Guidance for Wind-energy Development on BLM Land | 2009 |
| BLM Instruction Memorandum No. 2009-215, Planning for Special Designations within the National System of Public Lands. | 2009 |
| BLM Instruction Memorandum No. 2010-088, Guidance on 43 CFR 3809.100 and its Application | 2010 |
| BLM Instruction Memorandum No. 2010-117, Oil and Gas Leasing Reform — Land Use Planning and Lease Parcel Reviews | 2010 |
| BLM Instruction Memorandum No. 2011-003, Solar Energy Development Policy | 2010 |
| BLM Instruction Memorandum No. 2011-004, Transmittal of Revised Recreation and Visitor Services Land Use Planning Guidance | 2010 |
| BLM Instruction Memorandum No. 2012-043, Greater Sage-Grouse Interim Management Policies and Procedures | 2011 |
| BLM Instruction Memorandum No. 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy | 2011 |

| Bureau of Land Management Directive | Year |
|---|---|
| BLM Instruction Memorandum No. 2011-154, Requirement to Conduct and Maintain Inventory Information for Wilderness Characteristics and to Consider Lands with Wilderness Characteristics in Land Use Plans | 2011 |
| BLM Instruction Memorandum No. 2012-067, Clarification of Cultural Resource Considerations for Off-Highway Vehicle Designations and Travel Management | 2012 |
| BLM Instruction Memorandum No. 2012-141, Confidentiality of Paleontological Locality Information Under the Omnibus Public Lands Act of 2009 | 2012 |
| BLM Instruction Memorandum No. 2012-140, Collecting Paleontological Resources Under the Paleontological Resources Preservation Act of 2009 | 2012 |
| BLM Instruction Memorandum No. 2012-169, Resource Management Plan Alternative Development for Livestock Grazing | 2012 |
| BLM Manual 1601, Land Use Planning | 2000 |
| BLM Manual 1613, Areas of Critical Environmental Concern | 1988 |
| BLM Manual 1626, Travel and Transportation Manual | 2012 |
| BLM Manual 1737, Riparian Habitat | 1992 |
| BLM Manual 1740, Renewable Resource Improvements and Treatments | 2008 |
| BLM Manual 2800, Cadastral Surveys-General | 1985 |
| BLM Manual 2880, Mineral Leasing Act Rights-of-Way, Glossary of Terms | 2012 |
| BLM Manual 3031, Energy and Mineral Resource Assessment | 1985 |
| BLM Manual 3060, Mineral Reports – Preparation and Review, April 7, 1994 | 1994 |
| BLM Manual 4180, Land Health | 2001 |
| BLM Manual 4700, Wild Free-Roaming Horses and Burros Management | 2010 |
| BLM Manual 6250, National Scenic and Historic Trail Administration | 2012 |
| BLM Manual 6280, Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation | 2012 |
| BLM Manual 6330, Management of Wilderness Study Areas | 2012 |
| BLM Manual 6500, Manual of Wildlife, Fish and Plant Resources | 2002 |
| BLM Manual 6840, Special Status Species Management | 1988 |
| BLM Manual 6840, Special Status Species Policy | 2008 |
| BLM Manual 8100, Cultural Resource Management | 2004 |
| BLM Manual 8110, Identifying Cultural Resources | 2004 |
| BLM Manual 8120, Tribal Consultation Under Cultural Resources | 2004 |
| BLM Manual 8130, Planning for Uses of Cultural Resources | 2004 |
| BLM Manual 8140, Protecting Cultural Resources | 2004 |
| BLM Manual 8160, Native American Consultation and Coordination | 1990 |

| Bureau of Land Management Directive | Year |
|---|---|
| BLM Manual 8270, Paleontological Resource Management | 1998 |
| BLM Manual 8340, Off-Road Vehicles | 1982 |
| BLM Manual 8341, Conditions of Use (Off- Road Vehicles) | 1979 |
| BLM Manual 8342, Designation of Roads and Trails | 1988 |
| BLM Manual 8343, Vehicle Operations | 1979 |
| BLM Manual 8344, Permits | 1979 |
| BLM Manual 8351, Wild and Scenic Rivers | 1992 |
| BLM Manual 8400, Visual Resource Management | 1980 |
| BLM Manual 9113, Roads Manual | 2011 |
| BLM Manual Section 1703, Hazardous Materials Management | 2007 |
| BLM Manual Section 7240, Water Quality | 1978 |
| BLM Manual Section 7250, Water Rights | 1984 |
| BLM Policy Statement on Riparian Area Management | 1987 |
| BLM TR 1734-6 Version 4: Interpreting Indicators of Rangeland Health | 2005 |
| BLM TR 1737 series: Riparian Area Management Assessing Proper Functioning Condition for Lotic and Lentic Areas | 1998 |
| BLM Wyoming Riparian Management Activity Guide | 1991 |
| BLM Wyoming Sensitive Species Policy and List | 2002 |
| Board of Regents of the University of Oklahoma, 165 IBLA 231 | 2005 |
| BLM Grazing Administration Range Improvements and Water Rights (43 CFR 4100 et seq.) | 2002 (revised) |
| Cave Management (43 CFR 37.4[c] and 37.11[c][3][iii]) | 1988 |
| Competitive Leasing (43 CFR 3120) | 2002 |
| Delegation of Authority, Cooperative Agreements & Contracts for Oil & Gas Inspection (43 CFR 3190) | 1987 |
| Federal Coal Management Program Regulations (43 CFR Group 3400) | 1979 |
| Federal Manual for Identifying and Delineating Jurisdictional Wetlands | 1991 |
| Fish and Wildlife 2000 BLM National, State and District policies | 2000 |
| Geothermal Resource Leasing (43 CFR 3200) | 1998 |
| Geothermal Resources Unit Agreements (43 CFR 3280) | 1973 |
| Instruction Memorandum 2002-196 | 2002 |
| Instruction Memorandum 2003-020, Interim Wind Energy Development Policy | 2003 |
| Instruction Memorandum 2005-069, Offsite Compensatory Mitigation Guidelines | 2005 |
| Instruction Memorandum 2005-176, Filing of Protests on lands Included in Oil and Gas Lease Sales | 2005 |
| Instruction Memorandum 2005-210, Energy Policy and Conservation Act Inventory – Data Compilation for Phases III and IV | 2005 |
| Instruction Memorandum 2005-247, National Environmental Policy Act Compliance for Oil, Gas, and Geothermal Development | 2005 |
| Instruction Memorandum 2006-071, Process Improvement for Oil, Gas, Geothermal, Geophysical, and Related Rights-of-Way Approvals | 2006 |

| Bureau of Land Management Directive | Year |
|---|---|
| Instruction Memorandum 2006-197, BLM Energy and Non-Energy Mineral Policy | 2006 |
| Instruction Memorandum 2006-206, Oil and Gas Bond Adequacy Reviews | 2006 |
| Instruction Memorandum 2006-145, Cooperative Conservation Based Strategic Plan for the Abandoned Mine Lands Program | 2006 |
| Instruction Memorandum 2007-096, Refinement of the Methodology to Identify Abandoned Mine Land Sites Near Populated Places and High Use Areas | 2007 |
| BLM Instruction Memorandum 2009-011, Assessment and Mitigation of Potential Impacts to Paleontological Resources | 2008 |
| Instruction Memorandum No. WY-2003-011 | 2002 |
| Instruction Memorandum No. WY-2006-009 | 2006 |
| Mineral Leasing Act of 1920 (43 CFR From 3100-11 [July 2006], 43 CFR Part 3160) | 1920 |
| Mineral Leasing Act of 1920 (43 CFR 2006 3425.1–7[a][2][iv, v]) | 1920 |
| Mineral Leasing Act of 1920 (43 CFR 2006 3461.5[h][2][i]) | 1920 |
| Mineral Leasing Act of 1920 and others (43 CFR 2006 3591.1[b][10]) | 1920 |
| Mineral Leasing Act of 1920 and others (43 CFR 2006 3430.4-4[a][10]; 43 CFR 2006 3430.4-4[b][8]) | 1920 |
| Minerals Management, Generally (43 CFR 3000) | 1983 |
| National Contingency Plan Regulations (40 CFR 300) | 1994 |
| National Management Strategy for Motorized Off-Highway Vehicle Use on BLM Public Lands | 2001 |
| National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties | 1990 |
| National Register of Historic Places Eligibility (36 CFR Part 60.4) | 1966 |
| Natural Resource Damage Assessment Regulations (43 CFR Part 11) | 1986 |
| Noncompetitive Leasing (43 CFR 3110) | 1988 |
| Off-Road Vehicle Implementation Strategy Washakie Resource Area | 1994 |
| Oil and Gas Leasing (43 CFR 3100) | 1983 |
| Onshore Oil and Gas Geophysical Exploration (43 CFR 3150) | 1988 |
| Onshore Oil and Gas Operations (43 CFR 3160) | 1982 |
| Onshore Oil and Gas Unit Agreements; Unproven Areas (43 CFR 3180) | 1983 |
| Permits for Recreation on Public Lands (43 CFR 2930) | 2004 |
| Riparian-Wetlands Initiative for the 1990s, the U.S. Department of the Interior, BLM | 1992 |
| Solicitor's Opinion of January 17, 1986 | 1986 |
| Solicitor's Opinion of July 10, 1963 | 1963 |
| Solicitor's Opinion of October 12, 1956 | 1956 |
| Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming | 2004 |
| Standards for Healthy Rangelands, Standard #2 | 1997 |

| Bureau of Land Management Directive | Year |
|---|---|
| The Standards for Healthy Rangelands and Guidance for Livestock Grazing Management (43 CFR 4180) | 1997 |
| WO – Instruction Memorandum – 2002-034, Recent Changes in Management Direction: Federal Wildland Fire Management Policy, National Fire Plan | 2002 |
| WY Instruction Memorandum No. 2005-034, Travel Management Guidelines for the Public Lands in Wyoming | 2005 |
| WY Instruction Memorandum No. 89-402, April 3, 1989, Inspection and Enforcement Program for Locatable Minerals Activities | 1989 |
| WY-2001-040, Issuance of BLM (Wyoming) Sensitive Species Policy and List (Expires 9/30/02) | 2001 |
| Wyoming BLM Coal/Coal Bed Methane Policy | 2000 |
| Wyoming BLM Soil Program Ten Year Strategy | 2003 |
| Wyoming Instructional Memorandum 87-672, August 26, 1987 | 1987 |

## Table A.3. Applicable Wyoming State Laws and Regulations

| Wyoming State Laws and Regulations |
|---|
| Wyoming State Engineer's Office Statutes, Rules and Regulations |
| State of Wyoming Occupational Health and Safety Rules and Regulations |
| State of Wyoming Oil & Gas Conservation Commission Rules and Regulations |
| Wyoming Department of Environmental Quality Rules and Regulations |
| State of Wyoming Occupational Health and Safety Rules and Regulations |
| State of Wyoming Oil & Gas Conservation Commission Rules and Regulations |
| Wyoming Department of Environmental Quality Rules and Regulations |
| Wyoming Environmental Quality Act |
| State of Wyoming Water Quality Rules and Regulations |
| Wyoming Executive Department, Office of the Governor, Executive Order 2011–5. Greater Sage-grouse Core Area Protection |

## Table A.4. Memoranda and Agreements

| Memoranda and Agreements | Year | Description |
|---|---|---|
| Association of Fish and Wildlife Agencies, U.S. Forest Service (USFS), Bureau of Land Management (BLM), U.S. Fish and Wildlife Service | 2006 | Policies and guidelines for fish and wildlife management in National Forest and BLM Wilderness. |
| Yellowstone River Compact | 1950 | Between the states of Wyoming, Montana, and North Dakota was agreed upon to create an equitable division and apportionment of such waters; this compact ultimately controls the future and current uses of surface water resources in the basin. Ongoing litigation between Wyoming and Montana over the inclusion of groundwater in this compact is yet to be resolved. |

| Memoranda and Agreements | Year | Description |
|---|---|---|
| Memorandum of Understanding No. WY 19 | 2003 | Between the U.S. Department of the Interior (DOI), BLM, and the Wyoming Department of Environmental Quality (DEQ)-Land Quality Division (LQD) and addresses Management Of Surface Mining and Exploration for Locatable Minerals on Public Lands. It was signed November 11, 2003. This is a Supplemental Memorandum to the General Statewide Memorandum of Understanding (Memorandum of Understanding) dated October 1975, between the Governor of Wyoming and the United States, by and through the State Director, BLM, DOI. |
| Wyoming DEQ | N/A | There are currently no agreements between BLM and the State of Wyoming DEQ-LQD regarding exploration for or development of non-energy leasable minerals. Wyoming DEQ-LQD processes applications for these minerals under their "Non-Coal" rules and regulations. It is possible that the same Memorandum of Understanding between BLM and Wyoming DEQ-LQD for locatable minerals would have some valuable application should these two agencies need to work together to process applications related to non-energy leasable minerals. |
| Clean and Diversified Energy Initiative | 2005 | Recommends initiatives to facilitate the timely leasing and permitting of geothermal resources. |
| BLM Memorandum of Understanding WO300-2006-08, April 2006 | 2006 | Facilitate interagency coordination and establish policies and procedures to implement Section 225 of the Energy Policy Act of 2005. |
| National Memorandum of Understanding between the BLM and the Department of Defense | — | This Memorandum of Understanding outlines procedures for processing Notices of Intent (NOIs) to conduct geophysical operations when Air Force, Army, and Navy lands are involved. The Department of Defense will be the lead agency when their lands are involved in an NOI. |
| Interagency between BLM and Bureau of Reclamation Agreement | — | The BLM has jurisdiction over NOIs to conduct geophysical exploration which involve Bureau of Reclamation Agreement lands. The Bureau of Reclamation Agreement will be contacted for their conditions of approval. |

| Memoranda and Agreements | Year | Description |
|---|---|---|
| Memorandum of Understanding between BLM and State of Wyoming Oil and Gas Conservation Commission | — | Outlines the handling of NOIs to conduct geophysical exploration and sharing of information and compliance inspections. The State of Wyoming Oil and Gas Conservation Commission has jurisdiction over injection wells and spacing. |
| Memorandum of Agreement, between the Wyoming DEQ and the State of Wyoming Oil and Gas Conservation Commission | 1999 | Wyoming DEQ delegated permitting of road applications for oilfield wastes when the wastes are to be applied on the lease, unit, or communitized area. Wyoming DEQ still has the jurisdiction for permitting road application of oil field wastes outside of the lease, unit, or communitized area. |
| Interagency Agreement between the USFS and the BLM | 2006 | Establishes procedures for the administration of oil and gas operations on federal leases within the National Forest System. |
| Memorandum of Understanding BLM/Animal and Plant Health Inspection Service-Wildlife Services | 2003 | Detailing cooperative efforts between the two groups on suppression of grasshoppers and Mormon crickets on BLM lands (Document #03-8100-0870-MU, February 27, 2003) and local Natural Resources Conservation Service. |
| Western Association of Fish and Wildlife Agencies /USFS/BLM/USFWS Memorandum of Understanding (08-31-2000) | 2000 | Involving the management of sage grouse and their habitat. |
| Memorandum of Understanding between the BLM and the Department of Agriculture (60F26045-48) | 1995 | Predator control protocols were formalized in this Interagency Memorandum of Understanding. |
| Cooperative Agreements with Weed and Pest Districts: Bighorn County, Hot Springs County, Park County, Washakie County | — | Details cooperative efforts for noxious weed control on BLM-administered lands by the county weed and pest districts. |
| Programmatic Agreement Among BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Offices (SHPO) | 1997 | Regarding the manner in which BLM will meet its responsibilities under the National Historic Preservation Act. |
| State Protocol Agreement Between the Wyoming BLM State Director and the Wyoming SHPO | 2006 | Regarding the manner in which the BLM will coordinate with the Wyoming SHPO. |
| Memorandum of Agreement WY-7 | — | Memorandum of Agreement between the BLM and the Wyoming Recreation Commission; addresses land classifications and withdrawals to protect public lands generally, and specifically to protect historic trails. |
| Memorandum of Agreement WY-19 | — | Memorandum of Agreement between the BLM and the Wyoming Governor, addresses overall cooperation in public and state land management efforts. |

| Memoranda and Agreements | Year | Description |
|---|---|---|
| Memorandum of Agreement WY-20 | — | Memorandum of Agreement between the BLM and the Wyoming Game and Fish Commission, addresses a myriad of land and resource management issues, including classifications, land acquisition and disposal, and access. |
| Memorandum of Agreement WY-21 | — | Memorandum of Agreement between the BLM and Region II and Region IV of the USFS, addresses overall coordination on a myriad of land and resource management issues. |
| Memorandum of Agreement WY-63 | — | Memorandum of Agreement among the BLM, the USFS, Wyoming Department of Public Lands and the Wyoming Game and Fish Commission, addresses public land access and management of access problems. |
| Memorandum of Agreement WY-65 | — | Memorandum of Agreement between the BLM and the Agricultural Stabilization and Conservation Service (ASCS), addresses overall coordination on a myriad of land and resource management issues. |
| Memorandum of Agreement WY-77 | — | Memorandum of Agreement among the BLM, the ASCS, USFS, AES, and Wyoming State Conservation Commission, addresses overall coordination on conservation planning projects. |
| Memorandum of Agreement WY-117 | — | Memorandum of Agreement among the BLM and the Wyoming Board of Land Commissioners, the Wyoming SHPO and the Advisory Council on Historic Preservation, addresses cultural resource protection in state exchanges. |
| Memorandum of Agreement WY-118 | — | Memorandum of Agreement between the BLM and the Wyoming Board of Land Commissioners, addresses processing state exchanges. |
| Memorandum of Agreement WY-119 | — | Memorandum of Agreement between the BLM and the ASCS, addresses management of agricultural trespass. |
| Memorandum of Agreement WY-121 | — | Memorandum of Agreement between the BLM and the National Park Service, addresses management of the Oregon National Historic Trails. |
| Memorandum of Agreement WY-122 | — | Memorandum of Agreement among the BLM and the USFS, Wyoming Department of Public Lands, Wyoming Game and Fish Commission, Wyoming Recreation Commission, Wyoming Department of Agriculture, and the Wyoming State Planning Coordinator's Office, addresses access to public land. |

| Memoranda and Agreements | Year | Description |
|---|---|---|
| Memorandum of Agreement WY-131 | — | Memorandum of Agreement between the BLM and the Wyoming Game and Fish Department (WGFD), addresses overall coordination on land and resource management. |
| Memorandum of Agreement WY930-91-06-38 | — | Memorandum of Agreement between the BLM and the Wyoming Board of Land Commissioners, addresses exchange pooling. |
| Memorandum of Agreement WY930-91-06-39 | — | Memorandum of Agreement between the BLM and the Wyoming Board of Land Commissioners, addresses exchange of state land in holdings in wilderness areas. |
| Memorandum of Understanding WY920-08-07-192 | 2007 | Memorandum of Understanding WY920-08-07-192 between BLM, the Federal Highway Administration (FHWA), and the Wyoming Department of Transportation, addresses each agency's responsibilities in regard to processing Federal-aid highway appropriations. To implement Sections 107(d) and 317 of the Federal Aid Highway Act (23 U.S.C. 107[d] and 317), as amended, the agencies operate under this Memorandum of Understanding (updated in August 2007). All appropriations under the Federal Aid Highway Act are required to be consistent with the referenced Memorandum of Understanding. |
| Memorandum of Understanding WY920-02-09-108 | 2002 | Between the BLM, the FHWA, and the Wyoming Department of Transportation that defines each agency's responsibilities in regard to processing federal-aid highway appropriations. |
| Grass Creek Travel Management Area | — | BLM, Wyoming State Board of Land Commissioners, WGFD, LU Sheep Company, Travel Management in Grass Creek area. |
| Renner, Carter Billy Miles Tensleep Public Access Area | — | BLM, WGFD – Public access. |
| Medicine Lodge Habitat Management Unit Areas | — | BLM, WGFD – Public Access. |
| Double H Ranch Access Area | — | BLM, Double H Ranch, WG&F – Public Access. |
| Nowater OHV Trail System | — | BLM, Wyoming State Trails Program, Worland Chamber of Commerce, Ten Sleep Chamber of Commerce. |
| Cooperative Management Agreement between BLM, Worland District, LU Sheep Company, WGFD, Wyoming State Board of Land Commissioners | 1989 | |

| Memoranda and Agreements | Year | Description |
|---|---|---|
| Public Access Area Agreements Between BLM and WGFD | — | Public access area agreements to numerous BLM parcels on South Fork, Shoshone, North Fork Shoshone, Clarks Fork of the Yellowstone River, and Luce and Hogan Reservoirs. |
| Cooperative Management Agreement between BLM, Worland District, WGFD, Wyoming State Board of Land Commissioners, Double-H Ranch | June 1994 | |
| Assistance agreement KAA990028 – Abandoned Mine Land Reclamation Agreement | — | The Abandoned Mine Land program in Wyoming currently operates pursuant to this assistance agreement between the Wyoming State Office of the BLM and the Wyoming DEQ. It provides for the cooperative effort between the two agencies for a long term relationship to efficiently and economically plan for, and share responsibilities of, effective abandoned mine land reclamation on public lands in Wyoming. |
| March 1990, an Umbrella Memorandum of Understanding between the WGFD and BLM Wyoming for Management of the Fish and Wildlife Resources on the Public Lands was signed (No Number) | 1990 | The purpose of the Memorandum of Understanding is to strengthen the cooperative approach to the management of wildlife and wildlife habitat on public land between the two agencies and to encourage them to work together to develop, enhance, maintain, and manage wildlife resources, including planning and sharing data concerning biological resources. |
| The Paleontological Resources Preservation Act | 2009 | Recently signed legislation supplements existing laws and guidance regarding paleontological resources on BLM lands (e.g., Federal Land Policy and Management Act, BLM Manual 8270, and BLM Handbook H-8270-1). The Paleontological Resources Preservation Act became law on March 30, 2009, as part of the Omnibus Public Lands Management Act of 2009 (Public Law 111-011). The BLM has followed up with Instruction Memoranda that reinforce policies regarding confidentiality and paleontological collecting in light of the new law (Instruction Memorandum dated June 11, 2012, "Collecting Paleontological Resources Under the Paleontological Resources Preservation Act of 2009" and Instruction Memorandum dated June 11, 2012, "Confidentiality of |

| Memoranda and Agreements | Year | Description |
|---|---|---|
| | | Paleontological Locality Information under the Omnibus Public Lands Act of 2009”). |
| Omnibus Public Lands Management Act | 2009 | Recently signed legislation supplements existing laws and guidance regarding paleontological resources on BLM lands (e.g., Federal Land Policy and Management Act, BLM Manual 8270, and BLM Handbook H-8270-1). The Paleontological Resources Preservation Act became law on March 30, 2009, as part of the Omnibus Public Lands Management Act of 2009 (Public Law 111-011). The BLM has followed up with Instruction Memoranda that reinforce policies regarding confidentiality and paleontological collecting in light of the new law (Instruction Memorandum dated June 11, 2012, “Collecting Paleontological Resources Under the Paleontological Resources Preservation Act of 2009” and Instruction Memorandum dated June 11, 2012, “Confidentiality of Paleontological Locality Information under the Omnibus Public Lands Act of 2009”). |
| The Taylor Grazing Act | 1934 | The principle legislation used to administer livestock grazing on public lands until 1976 when Congress passed the Federal Land Policy and Management Act. |

# Appendix B. Maps

Maps are included in electronic format. In hardcopy documents, maps can be found on a compact disk (CD) attached to the inside back cover of Volume 2.

The maps provided with this document are for illustrative purposes only and might not accurately reflect all decisions due to the size of the resource area; details can be obscured or not readily apparent, or the size may appear larger on the maps so that the feature stands out when depicted on such a broad scale. The management actions that make up the Lander Proposed Resource Management Plan (RMP) are in all cases the decision and not modified by the manner in which the decision is displayed on the maps.

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# Appendix C. Recreation Management Area Forms

## Recreation Program Objectives

This appendix is focused solely on detailing the management of distinct Special Recreation Management Areas (SRMAs). Additional goals, objectives, and management actions for the Distinct Extensive Recreation Management Areas (ERMAs) and the rest of the planning area is detailed in Chapter 2. Table C.1, "Lander Field Office Recreation and Visitor Services Objectives" (p. 1453) below, displays the standard recreation objectives that apply to the entire Lander Field Office regardless of SRMA or ERMA status. Table C.2, "Difference in Recreation Management Areas" (p. 1454) below, displays the difference between SRMAs, Distinct ERMAs, and the rest of the planning area.

### Table C.1. Lander Field Office Recreation and Visitor Services Objectives

| Lander Field Office Wide Objective(s) |
|---|
| • **Resource Protection Objective:** Increase awareness, understanding, and a sense of stewardship in recreational activity participants so their conduct safeguards cultural and natural resources as defined by Wyoming Standards for Public Land Health or area-specific (such as Areas of Critical Environmental Concern and Wild and Scenic Rivers) objectives.<br><br>• **Visitor Health and Safety Objective:** Ensure that visitors are not exposed to unhealthy or unsafe human-created conditions (defined by a repeat or recurring incident in the same year, of the same type, in the same location, due to the same cause).<br><br>• **Use/User Conflict Objective:** Achieve a minimum level of conflict between recreation participants and (1) other resource/resource uses sufficient to enable the achievement of identified land use plan goals, objectives, and actions; (2) private land owners sufficient to curb illegal trespass and property damage; and (3) other recreation participants sufficient to maintain a diversity of recreation activity participation.<br><br>• **Objectives Ensuring Facilitation of Hunting Heritage and Wildlife Conservation.**<br>  ○ Expand Wildlife-Dependent Recreation opportunities on federal land<br>  ○ Improve and enhance access to public lands important for Wildlife-Dependent Recreation opportunities<br>  ○ Ensure the enjoyment of Wildlife-Dependent Recreation among various demographic groups<br>  ○ Facilitate trophy/high quality hunting opportunities in Wyoming Game and Fish Department hunt units targeted for special management criteria. |

**Table C.2. Difference in Recreation Management Areas**

| | SRMA | Distinct ERMA | The Rest of the Lander Field Office |
|---|---|---|---|
| ***Recreation Opportunity Management*** | Managed to **provide specific opportunities and settings** in response to visitor demand. | Managed to **provide diverse opportunities, as necessary to achieve planning objectives**. | Managed to **provide a diversity of recreation opportunities and settings**. |
| ***Allowable Uses and Management Actions*** | Allowable uses and management actions must **sustain or enhance recreation settings characteristics**. | Allowable uses and management actions **address recreation-tourism issues, activities, conflicts, and/or particular recreation setting**. | Management Actions and allowable uses may be necessary to protect resources or investments. |
| ***Management Common to All Areas*** | All areas are managed to meet statutory requirements to ensure resource protection, human health and safety, and reduce conflict as well as achieve other program planning objectives. | | |
| ERMA Extensive Recreation Management Area<br>SRMA Special Recreation Management Area | | | |

## Existing Management (Alternative A)

The 1987 Resource Management Plan (RMP) was drafted under old planning guidance and no longer meets the minimum planning decision requirements directed at planning for recreation and visitor services. Table C.3, "Existing Recreation Management (Alternative A)" (p. 1454) below, outlines the general management direction detailed in the existing plan.

**Table C.3. Existing Recreation Management (Alternative A)**

| Area Name | Area Type | Management Focus (Planning Objective) |
|---|---|---|
| National Historic Trail | SRMA | A management plan will provide detailed planning for SRMAs. |
| Continental Divide National Scenic Trail | SRMA | A management plan will provide detailed planning for SRMAs. |
| South Pass | SRMA | Management will be oriented toward maintaining recreational opportunities in terms of rustic, open-space settings. |
| ● Green Mountain Management Unit<br>● Gas Hills Management Unit<br>○ Lysite Badlands<br>○ Sweetwater Rocks<br>○ Copper Mountain<br>● Beaver Creek Management Unit<br>○ Government Draw<br>○ Beaver Rim<br>● Lander Slope Management Unit | ERMA | Recreation management will emphasize the resolution of user conflicts/competing uses and provide for resource protection. |

| Area Name | Area Type | Management Focus (Planning Objective) |
|---|---|---|
| ● East Fork Management Unit<br>● Dubois Management Unit<br>○ Warm Springs Canyon | | |
| Red Canyon Management Unit | ERMA | No direction provided. |
| Whiskey Mountain Management Unit | ERMA | The BLM will cooperate with the WGFD on non-consumptive wildlife visitor use management. |
| Dubois Badlands | ERMA | The area will be managed in its natural state. Recreation management will emphasize resolving competing uses and providing for resource protection. |
| BLM Bureau of Land Management<br>ERMA Extensive Recreation Management Area<br>SRMA Special Recreation Management Area<br>WGFD Wyoming Game and Fish Department | | |

As Table C.3, "Existing Recreation Management (Alternative A)" (p. 1454) demonstrates, historic planning for the recreation resource provided little future direction. This lack of direction resulted in several instances where visitor services and management actions were disjointed and sometimes in direct conflict with one another. For existing management to be in compliance with the new Land Use Planning Guidance, the management direction would need to be substantially overhauled so as to provide a similar level of detail contained under alternatives B and C. Table C.4, "Special Recreation Management Areas" (p. 1455) and Table C.5, "Distinct Extensive Recreation Management Areas" (p. 1456) below, display the recreation management areas for the various alternatives.

**Table C.4. Special Recreation Management Areas**

| Area Name | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| CDNST Destination SRMA<br>● Alkali Basin RMZ<br>● Sweetwater Mining RMZ | SRMA<br><br>(See Table C.3, "Existing Recreation Management (Alternative A)" (p. 1454)) | SRMA | See CDNST ERMA | Same as Alternative B |
| National Trails Undeveloped SRMA | SRMA (See Table C.3, "Existing Recreation Management (Alternative A)" (p. 1454)) | SRMA | See NHT and CDNST ERMA | Same as Alternative B (fewer acres) |
| Dubois Millsite Community SRMA | Planning area wide ERMA | SRMA | SRMA | Same as Alternative B |
| Lander Community SRMA<br>● Johnny Behind The Rocks RMZ<br>● Sinks Canyon RMZ<br>● The Bus @ Baldwin Creek RMZ | Planning area wide ERMA | SRMA | Planning area wide ERMA | Same as Alternative B (fewer acres) |

| Area Name | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| NHTs Destination SRMA<br>● NHTs Auto Tour Route RMZ<br>● NHTs Group Use RMZ | SRMA (see Table C.3, "Existing Recreation Management (Alternative A)" (p. 1454)) | SRMA | See NHT ERMA | SRMA |
| Sweetwater Canyon Undeveloped SRMA | Planning area wide ERMA | SRMA | Distinct ERMA | SRMA |
| Sweetwater Rocks Undeveloped SRMA | Distinct ERMA | SRMA | Distinct ERMA | SRMA (fewer acres than Alternative B) |
| CDNST Continental Divide National Scenic Trail<br>ERMA Extensive Recreation Management Area<br>NHT National Historic Trail<br>RMZ Recreation Management Zone<br>SRMA Special Recreation Management Area | | | | |

## Table C.5. Distinct Extensive Recreation Management Areas

| Area | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| Castle Gardens ERMA<br>Copper Mountains WSA<br>Dubois Badlands WSA | Distinct ERMA | Distinct ERMA | Distinct ERMA | No Recreation Management Area |
| Beaver Creek Nordic Ski Area | Planning area wide ERMA | Distinct ERMA | Distinct ERMA | Distinct ERMA |
| Coalmine/Government Draw | Distinct ERMA | Distinct ERMA | R&PP Lease | No Lease, No Recreation Management Area |
| Green Mountain ERMA and ACEC<br>Lander Slope/Red Canyon ACECs<br>Whiskey Mountain/Eastfork ACECs | Distinct ERMA | Distinct ERMA | Distinct ERMA | Same as Alternative C |
| Muskrat Basin ERMA<br>Agate Flats ERMA | Planning area wide ERMA | Distinct ERMA | Distinct ERMA | No Recreation Management Area |
| NHTs ERMA<br>(¼ mile on either side of the Trail not contained within a SRMA) | SRMA (see Table C.4, "Special Recreation Management Areas" (p. 1455)) | Distinct ERMA (Portions of the trail) (more acres than Alternative C) | Distinct ERMA (entire trail) (fewer acres than Alternative B) | Same as Alternative B |
| CDNST ERMA<br>(Trail area not contained within a SRMA) | SRMA (see Table C.4, "Special Recreation Management Areas" (p. 1455)) | Distinct ERMA (¼ mile on either side of portions of the trail) (fewer acres than Alternative C) | Distinct ERMA (¼ mile on either side of the entire trail) (more acres than Alternative B) | Same as Alternative B |
| ACEC Area of Critical Environmental Concern<br>CDNST Continental Divide National Scenic Trail<br>ERMA Extensive Recreation Management Area<br>NHT National Historic Trail<br>R&PP Recreation and Public Purposes<br>SRMA Special Recreation Management Area<br>WSA Wilderness Study Area | | | | |

# Continental Divide National Scenic Trails (Alternatives B and D)

## Table C.6. Alkali Basin Recreation Management Zone

| SUPPORTING INFORMATION<br><br>This documents the rationale for consideration of the Special Recreation Management Area (SRMA) in the planning process and, if selected, designation of the SRMA in the record of decision. |
|---|
| This SRMA is necessary to accommodate national visitor demand for destination oriented long distance trail opportunities in semi-arid sagebrush step regions; this demand has been identified by onsite customers, through community involvement workshops, and through the enabling legislation for the Continental Divide National Scenic Trail (CDNST). The CDNST in the area runs along a high plateau that provides overlook views of the great divide basin, numerous prairie and mountain wildlife species, and is a physically challenging trail. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. |
| **SRMA/RECREATION MANAGEMENT ZONE (RMZ) OBJECTIVE(S) DECISIONS**<br><br>**Objectives describe the intended recreation activities, experiences and benefits. SRMAs may be subdivided into RMZs with discrete objectives.** |
| **Objective Statement:** The Alkali Basin RMZ of the CDNST Destination SRMA will be sustained or enhanced for thru-travelers and middle country hunters (fall) to engage in horseback riding, hiking, hunting (fall), and mountain biking, so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below: |
| **Activities:** Horse riding/packing, Hiking/backpacking, and Hunting (fall)<br><br>**Experiences:** Enjoying the sensory experience of a natural landscape, Testing endurance, Escaping everyday responsibilities and, and Being isolated and independent.<br><br>**Benefits:** Enhanced awareness and understanding of nature, Closer relationship with the natural world, Improved opportunity to view wildlife close-up, Improved mental health, Improved physical health, Greater retention of distinctive natural landscape features, and Enhanced ability for visitors and residents to find areas providing desired recreation experiences and benefits. |
| **RECREATION SETTING CHARACTERISTIC DESCRIPTIONS**<br><br>**Physical, social and operational recreation setting qualities to be maintained or enhanced.** |
| **Physical Characteristics:** The CDNST in the area will continue to be on or near motorized routes but at least a ½ mile from improved roads, though they may be in sight. The natural setting of the area may have modifications that would be noticed but not draw the attention of an observer wandering through the area (Visual Resource Management Class II). Facilities and structures in support of recreation and other uses will continue to be rare.<br><br>**Social Characteristics:** Average encounters per day during peak CDNST use season (July-September), will not exceed for three consecutive years, 3 encounters per day at known campsite locations, and 6 encounters per day on travel routes. Usual group size will be small.<br><br>**Operational Characteristics:** 4-wheel drive vehicles, all-terrain vehicles, dirt bikes, or over-snow vehicles, in addition to nonmotorized mechanized use will continue to be allowed when the trail is on existing or open roads so long as the use does not interfere with the nature and purpose of the CDNST. Motorized vehicles are not allowed on areas where the trail travels cross-country off existing roads or where the trail travels along a closed road. Onsite controls and services will continue to be present but subtle. Offsite services and controls will be provided in the minimum amount necessary to reach management objectives. |
| **MANAGEMENT ACTIONS AND ALLOWABLE USE DECISIONS**<br><br>**Land use plan-level management actions and allowable use decisions for the recreation and visitor services program and other programs necessary to: support the recreation objective, maintain or enhance the desired Recreation Setting Characteristics, address visitor health/safety, mitigate recreation impacts on cultural/natural resources, and reduce use/user conflicts.** |

**Recreation and Visitor Services Program:**

- Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
- The area will be closed to competitive events. Other Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
- Continue to enhance the availability of dependable non-potable water sources for trail hikers.
- Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information.
- Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
- Consider the use of a memorandum of understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.

**Other Programs:**

- Class II Visual Resource,
- Additional Allowable Use Decisions for the CDNST are contained in Table 2.33, "7000 Special Designations (SD) – Congressionally Designated Trails" (p. 191).

**IMPLEMENTATION DECISIONS**

**Actions to achieve or implement land use plan decisions. If implementation decisions are included in the land use planning document they must have site-specific environmental analysis and be clearly distinguished as appealable decisions.**

**Implementation Decisions:** (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.)

## Table C.7. Sweetwater Mining Recreation Management Zone

**SUPPORTING INFORMATION**

This Special Recreation Management Area (SRMA) is necessary to accommodate national and regional visitor demand for destination oriented long distance trail and day use trail hiking/learning opportunities in a richly historic area. This demand has been identified by onsite customers, through community involvement workshops, and through the enabling legislation for the Continental Divide National Scenic Trail (CDNST). The CDNST in the area runs through the historic Sweetwater Mining District where historic remains are interpreted and stabilized for public enjoyment. Several existing facilities in the area provide camping, and day use trail/driving for pleasure opportunities. The area also contains a high diversity of vegetation and wildlife, providing additional opportunities for sightseeing and wildlife oriented recreation. SRMA management will sustain and enhance these amenities, as well as accommodate the visitor demand.

**SRMA/RECREATION MANAGEMENT ZONE (RMZ) OBJECTIVE(S) DECISIONS**

**Objective Statement:** Manage the Sweetwater Mining District RMZ of the CDNST Destination SRMA for day user and CDNST thru-travelers to engage in cultural site visitation, driving for pleasure, photography, horseback riding, hiking, and mountain biking, so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:

**Activities:** Cultural site visitation, Driving for pleasure, Photography, Horse riding/packing, Developed site camping, Hiking/backpacking, and Mountain biking.

**Experiences:** Testing your endurance, Enjoying the closeness of friends and family, Learning more about things here, Feeling good about the way our cultural heritage is being protected, and Developing skills and abilities.

**Benefits:** Improved capacity for outdoor physical activity, Improved mental health, Stronger ties with my family and friends, Greater respect for cultural heritage, Increased appreciation of area's cultural heritage, Greater opportunity for people with different skills to exercise in the same place, Greater household awareness of and appreciation for our cultural heritage, Greater protection of area historic structures and archeological sites, and Enhanced ability for visitors and residents to find areas providing desired recreation experiences and benefits.

**RECREATION SETTING CHARACTERISTIC DESCRIPTIONS**

**Physical Characteristics:** The CDNST in the area will continue to be on or near motorized routes but at least a ½ mile from improved roads, though they may be in sight. The natural setting of the area may have modifications that would be noticed but not draw the attention of an observer wandering through the area (Visual Resource Management Class II). Facilities and structures in support of recreation and other uses will continue to be rare along the CDNST. Additional facilities and structures may be added in areas out of sight or away from the CDNST.

**Social Characteristics:** On the CDNST usually 7-14 encounters per day will occur off travel routes (e.g., staging areas, campgrounds), and 15-29 encounters per day en route. Usual group size is small to moderate. Encounters will largely increase around developed sites and roads adjacent to the CDNST.

**Operational Characteristics:** 4-wheel drive vehicles, all-terrain vehicles, dirt bikes, or over-snow vehicles in addition to nonmotorized mechanized use, are allowed in the area. Motorized uses will not be encouraged or facilitated on the CDNST. Motorized or mechanized use will not interfere with the nature and purpose of the CDNST. Motorized vehicles are not allowed off existing roads, on areas where the trail travels cross-country off existing roads, or where the trail travels along a closed road or nonmotorized trail. Onsite controls and services will be present but harmonize with the natural and historic environment.

**MANAGEMENT ACTIONS AND ALLOWABLE USE DECISIONS**

**Recreation and Visitor Services Program:**

- Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
- Continue to enhance the availability of dependable non-potable water sources for trail hikers.
- Motorized and mechanized travel in the SRMA is limited to existing roads and trails.
- Work with the local back country horsemen to teach equine Leave No Trace, as well as potentially provide additional horseback facilities (corrals etc.) and trails.
- Investigate opportunities to re-route the CDNST near Phelps-Dodge Bridge, so thru-hikers do not have to parallel the Atlantic City-Three Forks County Road.
- The CDNST through the area will be closed to competitive events, however other Special Recreation Permits will be permitted so long as setting condition and outcome objectives can be maintained.
- Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information.
- Work with partners to provide additional interpretation of the historic buildings and other remnants.
- Implement the Miners Delight Interpretation Plan.
- Develop SRMA information and interpretation that connects trail opportunities with developed sites and campgrounds.
- Develop better onsite visitor orientation so visitors to the South Pass State Park are aware of ½ and 1 day CDNST and Volksmarch trail opportunities in the area.
- Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through customer assessments (focus group interviews or visitor studies).
- Monitor recreation setting condition through onsite patrols during the trails high use season (June-September).

**Other Programs:**

- Class II Visual Resource,
- Additional Allowable Use Decisions for the CDNST are contained in Table 2.33, “7000 Special Designations (SD) – Congressionally Designated Trails” (p. 191).

**IMPLEMENTATION DECISIONS**

Implementation Decisions: (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.)

# Designated Trails Undeveloped Special Recreation Management Area (Alternatives B and D)

## Table C.8. Designated Trails Recreation Management Zone

| SUPPORTING INFORMATION |
|---|
| This Special Recreation Management Area (SRMA) is necessary to accommodate local and national visitor demand for undeveloped Congressionally Designated Trail opportunities in semi-arid sagebrush step regions; this demand has been identified by onsite customers, through community involvement workshops, visitor surveys, and through the enabling legislation of the National Historic and Scenic Trails. The area contains 3 Congressionally Designated Trails including: Oregon and California National Historic Trails and the Continental Divide National Scenic Trail (CDNST). The area has abundant prairie wildlife, nearly pristine Wyoming Basin viewshed, and a high probability for solitude. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. |
| **SRMA/RECREATION MANAGEMENT ZONE (RMZ) OBJECTIVE(S) DECISIONS** |
| **Objective Statement:** The Designated Trails Undeveloped SRMA will be sustained or enhanced for individuals or small groups of historic trail 'rut buffs', CDNST thru-hikers, and middle country hunters (fall season) to engage in cultural site visitation, driving for pleasure, photography, horseback riding, hunting, and hiking so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:<br><br>**Activities:** Cultural site visitation, Driving for pleasure/photography, Horseback riding, Hiking/backpacking, and Hunting.<br><br>**Experiences:** Enjoying exploring on my own or in small groups, Enjoying nature, Reflecting on the historical significance of the trail and the people who traveled it, and Feeling good about solitude.<br><br>**Benefits:** Better mental health and health maintenance, Greater respect and appreciation for the areas cultural history, Greater appreciation of the outdoors environment, Closer relationship with the natural world, Greater household awareness of and appreciation of our cultural heritage, Protection of cultural sites, Maintenance of distinctive historical recreation setting, and Increased sense of stewardship for the resource. |
| **RECREATION SETTING CHARACTERISTIC DESCRIPTIONS** |
| **Physical Characteristics:** Majority of the area is on or near 4-wheel drive roads, but at least ½ mile from all improved roads, though they may be in sight. Natural setting may have subtle modifications that would be noticed but not draw the attention of the casual observer wandering through the area. Trails may exist but do not exceed standard to carry expected use. Facilities and structures are extremely rare. However, nonmotorized trail opportunities will be the focus for visitor services/facilities in this area.<br><br>**Social Characteristics:** Usually fewer than 3-6 encounters per day on the Congressionally Designated Trails. Usually group sizes are small in relation to the surrounding area.<br><br>**Operational Characteristics:** 4-wheel drive vehicles, all-terrain vehicles, dirt bikes, or over-snow vehicles in addition to nonmotorized mechanized use, are allowed in the area so long as the use does not interfere with the nature and purpose of the CDNST. Motorized uses will not be encouraged or facilitated in the area. Motorized vehicles are not allowed off existing roads, on areas where the trail travels cross-country off existing roads, or where the trail travels along a closed road or nonmotorized trail. Onsite controls and services present but subtle. Minimum amount necessary to achieve planning objectives. |
| **MANAGEMENT ACTIONS AND ALLOWABLE USE DECISIONS** |

**Recreation and Visitor Services Program:**

- Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
- The Bureau of Land Management (BLM) and partners will review (using the BLM's contrast rating system) existing facilities and interpretive exhibits to ensure designs harmonize with the characteristic landscape; designs out of character with the landscape will be modified so as not to overpower the landscape.
- Emergency closures will be imposed when necessary to protect the historic trail resource.
- The BLM will not authorize temporary: facilities, campsites, or staging/parking areas to support Special Recreation Permits within this RMZ. Motorized tours will not be authorized in this RMZ.
- In this RMZ, the BLM will authorize special recreation permits for trail oriented nonmotorized group activities consistent with the outcome objective and recreation setting prescriptions above.
- No competitive events will be authorized in this RMZ.
- Additional management actions will be applied as needed to reduce unplanned visitor impacts (vandalism, social trails, and litter etc.). Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information.
- Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all offsite visitor information.
- Some light onsite visitor orientation (kiosk and trail markers) will be developed.
- No new onsite interpretation will be developed on the National Historic Trail in this area.
- Engage local businesses and other partners to ensure promotional material does not over advertise the area.
- Solicit partnerships and cooperative agreements to: Monitor outcome attainment and preferences through customer assessments (focus group interviews or visitor studies).
- Monitor recreation setting condition through onsite patrols during the trails high use season (June-September).

**Other Programs:**

- Class II Visual Resource.
- Additional Allowable Use Decisions for the CDNST and the National Historic Trails are contained in Table 2.33, "7000 Special Designations (SD) – Congressionally Designated Trails" (p. 191).

**IMPLEMENTATION DECISIONS**

**Implementation Decisions:** (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.)

# Dubois Mill Site Special Recreation Management Area (Alternatives B and D)

### Table C.9. Dubois Mill Site Recreation Management Zone (Alternatives B and D)

**SUPPORTING INFORMATION**

**This documents the rationale for consideration of the Special Recreation Management Area (SRMA) in the planning process and, if selected, designation of the SRMA in the record of decision.**

This SRMA is necessary to accommodate local visitor demand for close to home nonmotorized recreation opportunities; this demand has been identified by onsite customers, through community involvement workshops, and through the Dubois Gateway Plan. The public lands in this area are adjacent to newly acquired lands managed by the town of Dubois as open space and a recreational use area for the citizens. These newly acquired lands currently provide undeveloped nonmotorized access to large blocks of Bureau of Land Management (BLM)-administered land, a Wyoming Game and Fish Department habitat management area, and U.S. Forest Service lands. The public lands in the area contain a multitude of wildlife oriented recreation opportunities as well as several scenic vistas. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

**SRMA/RECREATION MANAGEMENT ZONE (RMZ) OBJECTIVE(S) DECISIONS**

**Objectives describe the intended recreation activities, experiences and benefits. SRMAs may be subdivided into RMZs with discrete objectives.**

**Objective Statement:** The Dubois Mill-Site Community SRMA will be sustained or enhanced for nonmotorized recreationists to engage in hiking, walking, horseback riding, wildlife viewing, and hunting so that participants in visitor assessments/surveys report a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:

**Activities:** Hiking, Walking, Running, Horseback riding, Wildlife viewing, and Hunting.

**Experiences:** Escaping everyday responsibilities for a while, Enjoying frequent access to outdoor physical activity in a natural environment, and Enjoying the areas wildlife, scenery, views, and aesthetics.

**Benefits:** Better mental and physical health, Increased satisfaction with life, Greater cultivation of an outdoor oriented lifestyle, Greater understanding and respect for private property, Heightened sense of community pride and satisfaction, Greater environmental awareness and stewardship, Greater aesthetic appreciation, and Preservation of this special place.

**RECREATION SETTING CHARACTERISTIC DESCRIPTIONS**

**Physical, social and operational recreation setting qualities to be maintained or enhanced.**

**Physical Characteristics:** The area is within ½ mile of the town of Dubois. The natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. Trails may exist but will not exceed standard and density to carry expected use. Facilities and structures are rare and within close proximity to highway/parking area.

**Social Characteristics:** Usually 7-14 encounters with other groups per day.

**Operational Characteristics:** Mountain bikes and other mechanized use, but all use is nonmotorized. Onsite controls and services are present, but harmonize with the natural environment. Offsite services such as an area brochure will be available.

**MANAGEMENT ACTIONS AND ALLOWABLE USE DECISIONS**

**Land use plan-level management actions and allowable use decisions for the recreation and visitor services program and other programs necessary to: support the recreation objective, maintain or enhance the desired Recreation Setting Characteristics, address visitor health/safety, mitigate recreation impacts on cultural/natural resources, and reduce use/user conflicts.**

**Recreation and Visitor Services Program:**

- Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
- Pursue partnerships with the town of Dubois and other Dubois Gateway Plan partners to ensure continued enforcement of travel management designations.
- Establish light connecting nonmotorized loop trails, as discussed in community project plan.
- Develop partnerships to pursue land acquisitions and easements necessary to maintain characteristic landscape, natural setting, and targeted experiences and benefits.
- Ensure targeted experiences and benefits, as well as recreation setting information is included and explained in all visitor information.
- Promote the RMZ to the Dubois community through partnerships with local community businesses and the town of Dubois.
- Light interpretation may be developed to facilitate targeted outcomes; utilize community members, academic organizations, and community centers to meet needs for higher levels of education and interpretation.
- The BLM will assist the community with project design, technical expertise, and other services in order to help achieve the objectives outlined in the Dubois Gateway Plan document.
- Develop a memorandum of understanding between the BLM, Dubois Gateway Plan members, and the community of Dubois to ensure continued cooperative community stewardship of public lands contained within the RMZ.
- Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through customer assessments (focus group interviews or visitor studies).
- Monitor recreation setting condition through onsite patrols (June-September).

**Other Programs:**

- Closed to Fluid Mineral Leasing (alternatives B and D)
- Closed to Geothermal Development (alternatives B and D)

| |
|---|
| • Closed to Geophysical Exploration (alternatives B and D)<br>• Closed To Mineral Material Sales and Free Use Permits (alternatives B and D)<br>• New rights-of-ways are excluded (alternatives B and D)<br>• Renewable Energy Development is excluded (alternatives B and D)<br>• Petition to withdrawal from entry under the 1872 Mining Law (alternatives B and D)<br>• The SRMA is managed as a Class II Visual Resource (alternatives B and D)<br>• Closed to motorized vehicle use (alternatives B and D) |
| **IMPLEMENTATION DECISIONS**<br><br>**Actions to achieve or implement land use plan decisions. If implementation decisions are included in the land use planning document they must have site-specific environmental analysis and be clearly distinguished as appealable decisions.** |
| **Implementation Decisions:** (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.) |

# Dubois Mill Site Special Recreation Management Area (Alternative C)

### Table C.10. Dubois Mill Site Recreation Management Zone (Alternative C)

| |
|---|
| **SUPPORTING INFORMATION**<br><br>**This documents the rationale for consideration of the Special Recreation Management Area (SRMA) in the planning process and, if selected, designation of the SRMA in the record of decision.** |
| Same as alternatives B and D except for the following: SRMA management will sustain and enhance motorized access to the area as well as accommodate the visitor demand. |
| **SRMA/RECREATION MANAGEMENT ZONE (RMZ) OBJECTIVE(S) DECISIONS**<br><br>**Objectives describe the intended recreation activities, experiences and benefits. SRMAs may be subdivided into RMZs with discrete objectives.** |
| **Objective Statement:** The Dubois Mill-Site Community SRMA will be sustained or enhanced for nonmotorized and motorized recreationists to engage in hiking, walking, horseback riding, wildlife viewing, hunting, and motorized trail riding, so that participants in visitor assessments/surveys report a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:<br><br>**Activities:** Hiking, Walking, Running, Horseback riding, Wildlife viewing, Hunting, and Motorized trail riding.<br><br>**Experiences:** Escaping everyday responsibilities for a while, Developing skills and abilities, Enjoying having access to close to home outdoor amenities, Enjoying risk taking, and Sharing/talking about your equipment with others.<br><br>**Benefits:** Better mental and physical health, Increased satisfaction with life, Greater cultivation of an outdoor oriented lifestyle, Improved outdoor recreation skills, Greater sense of adventure, Enhanced sense of freedom, Greater opportunity for people with different skills to exercise in the same place, Improved physical capacity to do my favorite activity, Greater understanding and respect for private property, and Heightened sense of community pride and satisfaction. |
| **RECREATION SETTING CHARACTERISTIC DESCRIPTIONS**<br><br>**Physical, social and operational recreation setting qualities to be maintained or enhanced.** |

**Physical Characteristics:** Within ½ mile of the town of Dubois. Motorized use will be allowed on the designated trail through the area. Natural setting may have modifications that would be noticed, but not draw the attention of an observer wandering through the area. Trails may exist but do not exceed standard and density to carry expected use. Facilities and structures are rare and within close proximity to highway/parking area.

**Social Characteristics:** Usually 7-14 encounters with other groups per day.

**Operational Characteristics:** Motorized use will be allowed on the identified trail (existing access road); the area southwest of the existing access road along Jakey's Fork Rim will be closed to motorized vehicle use. Onsite controls and services are present, but harmonize with the natural environment. Offsite services such as an area brochure will be available.

**MANAGEMENT ACTIONS AND ALLOWABLE USE DECISIONS**

**Land use plan-level management actions and allowable use decisions for the recreation and visitor services program and other programs necessary to: support the recreation objective, maintain or enhance the desired Recreation Setting Characteristics, address visitor health/safety, mitigate recreation impacts on cultural/natural resources, and reduce use/user conflicts.**

**Recreation and Visitor Services Program:**

- Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
- Pursue partnerships with the town of Dubois and other Dubois Gateway Plan partners to ensure continued enforcement of travel management designations.
- Establish light connecting nonmotorized loop trails as discussed in community project plan.
- Work with the state trails program to ensure effective enforcement of motorized travel limitations in the area.
- Motorized seasonal closures will be implemented with gates at the best available location for enforcement and to ensure control of motorized use.
- The area will be closed to over snow travel.
- Develop partnerships to pursue land acquisitions and easements necessary to maintain characteristic landscape, natural setting, and targeted experiences and benefits.
- Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information.
- Promote the RMZ to the Dubois community through partnerships with local community businesses and the town of Dubois.
- Light interpretation may be developed to facilitate targeted outcomes; utilize community members, academic organizations, and community centers to meet needs for higher levels of education and interpretation.
- The BLM will assist the community with project design, technical expertise, and other services, in order to help achieve the objectives outlined in the Dubois Gateway Plan document.
- Develop a memorandum of understanding between the Bureau of Land Management, Dubois Gateway Plan members, and the community of Dubois to ensure continued cooperative community stewardship of public lands contained within the RMZ.
- Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through customer assessments (focus group interviews or visitor studies).
- Monitor recreation setting condition through onsite patrols (June-September).

**IMPLEMENTATION DECISIONS**

**Actions to achieve or implement land use plan decisions. If implementation decisions are included in the land use planning document they must have site-specific environmental analysis and be clearly distinguished as appealable decisions.**

**Implementation Decisions:** (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.)

# Lander Community Special Recreation Management Area (Alternatives B and D)

## Table C.11. Johnny Behind the Rocks Recreation Management Zone

| SUPPORTING INFORMATION |
|---|
| This Special Recreation Management Area (SRMA) is necessary to accommodate local visitor demand for close to home nonmotorized recreation opportunities in the Lander area; this demand has been identified by onsite customers and through community involvement workshops. The public lands in this area are located within a 15 minute drive of the town of Lander. The area currently provides a limited amount of nonmotorized trail opportunities, with diverse and appealing topography. The public lands in the area also contain a multitude of wildlife oriented recreation opportunities as well as several scenic vistas including a prairie waterfall. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. |
| **SRMA/RECREATION MANAGEMENT ZONE (RMZ) OBJECTIVE(S) DECISIONS** |
| **Objective Statement:** The Johnny Behind the Rocks RMZ of the Lander Community SRMA will be sustained or enhanced for nonmotorized recreationists to engage in horseback riding, hiking, trail running, wildlife viewing, and mountain biking so that participants in visitor assessments/surveys report a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:<br><br>**Activities:** Horseback riding, Trail running, Mountain biking, Hiking, and Wildlife viewing.<br><br>**Experiences:** Enjoying the sensory experience of a natural landscape, Enjoying exercise and physical fitness, Developing skills and abilities, Enjoying having access to close to home outdoor amenities, and Feeling that this community is a special place to live.<br><br>**Benefits:** Improved mental and physical health, Greater connection to nature, Improved opportunity to view wildlife close up, Greater sense of place, Improved outdoor recreation skills, Heightened sense of satisfaction with our community, and Reduced adverse human impacts such as litter, vegetative trampling, and unplanned trails. |
| **RECREATION SETTING CHARACTERISTIC DESCRIPTIONS** |
| **Physical Characteristics:** Majority of the area is on or near improved country roads, but at least ½ mile from any highways, except in the area directly adjacent to Highway 287. Natural setting may have subtle modifications that would be noticed but not draw the attention of the casual observer wandering through the area. Facility and trail development will focus on sufficient densities and developments to provide for a full day (6 to 8 hours or up to 40 miles of trail) of use. Facilities and structures will continue to be rare and co-located within close proximity to highway/parking area.<br><br>**Social Characteristics:** Usually 3-6 encounters per day off travel routes and 7-15 encounters per day on travel routes. Usual group size is small.<br><br>**Operational Characteristics:** Excluding county roads, adjacent highway, the Blue Ridge Road, and livestock permittee access to range improvements; the area will be managed for mountain bikes and non motorized use. Mechanized trail building will be approved as needed to support the identified outcome objective. Onsite controls and services are present, but harmonize with the natural environment. |
| **MANAGEMENT ACTIONS AND ALLOWABLE USE DECISIONS** |

**Recreation and Visitor Services Program:**

- Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
- Implement closures to motorized vehicle use; utilize administrative access agreements to allow for the maintenance of range improvements.
- New trails will be identified in a master trails plan developed through implementation-level decision making.
- Pursue a land trade and access agreements for parcels in and adjacent to this RMZ.
- Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all offsite visitor information.
- Engage local sporting good businesses and other partners in the development and distribution of a brochure and/or area guide book.
- Some light onsite visitor orientation (kiosk and trail markers) will be developed.
- This RMZ will be managed in a custodial fashion, until which time that a 'friends group' or local club demonstrates a willingness to be involved in the management and stewardship of the site.
- A memorandum of understanding (MOU) will be developed between the Bureau of Land Management (BLM) and pertinent partners such as livestock grazing permittees, local sporting good retailers, and an established friends group or club. The MOU will assign responsibility for the stewardship and development of the site and related amenities; the majority of the cost and labor responsibilities associated with initial investments and maintenance of the identified trails and related amenities will be born upon the established friends group or club.
- The BLM and other partners will provide matching contributions when funding and labor pool allows.
- Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through customer assessments (focus group interviews or visitor studies).
- Monitor recreation setting condition through onsite patrols May-November.

**Other Programs:**

- No Surface Occupancy for Oil and Gas Development (alternatives B and D)
- Closed to Geothermal Development (alternatives B and D)
- Closed to Geophysical Exploration (alternatives B and D)
- Closed To Material Sales and Free Use Permits (alternatives B and D)
- Closed to sand and gravel disposal (alternatives B and D)
- New rights-of-ways are excluded (alternatives B and D)
- Renewable Energy Development is excluded (alternatives B and D)
- Closed to salable materials (alternatives B and D)
- Petition to withdrawal from entry under the 1872 Mining Law (alternatives B and D)
- The SRMA is managed as a Class II Visual Resource (alternatives B and D)
- Closed to motorized vehicle use (alternatives B and D)

**IMPLEMENTATION DECISIONS**

**Implementation Decisions:** (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.)

## Table C.12. Sinks Canyon Recreation Management Zone

**SUPPORTING INFORMATION**

This Special Recreation Management Area (SRMA) is necessary to accommodate local visitor demand for close to home nonmotorized muscle powered recreation opportunities in the Lander area; this demand has been identified by onsite customers and through community involvement workshops. The area currently provides a limited amount of nonmotorized trail opportunities, and world renowned climbing opportunities. Adjacent to Wyoming State Parks and U.S. Forest Service (USFS) lands, provide additional day hiking and overnight camping opportunities. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

**SRMA/RECREATION MANAGEMENT ZONE OBJECTIVE(S) DECISIONS**

The Sinks Canyon Climbing area of the Lander Valley Community SRMA will be sustained or enhanced for muscle-powered recreationists to engage in climbing and hiking so that participants in visitor assessments/surveys report a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes below:

**Activities:** Climbing, and Hiking.

**Experiences:** Enjoying risk taking adventure, Developing skills and abilities, Enjoying meeting new people, Enjoying teaching others about the outdoors, Feeling that this community is a special place to live, and Feeling good about how this attraction is being used and enjoyed.

**Benefits:** Improved mental and physical health, Improved skills for outdoor enjoyment, Improved leadership abilities, Improved teamwork and cooperation, Better sense of place, Heightened sense of satisfaction with our community, Increased local tourism revenue, and Greater value-added local services/industry.

**RECREATION SETTING CHARACTERISTIC DESCRIPTIONS**

**Physical Characteristics:** Majority of the area is on or near improved country roads, but at least ½ mile from any highways, except in the area directly adjacent to Highway 287. Natural setting may have subtle modifications that would be noticed but not draw the attention of the casual observer wandering through the area. Trails may exist but do not exceed standard and density to carry expected use. Facilities and structures are rare and isolated.

**Social Characteristics:** People seem to be everywhere, but human contact remains intermittent.

**Operational Characteristics:** Excluding county roads, adjacent highway, adjacent United States Forest Service (USFS) and private roads; motorized use will not be allowed on Bureau of Land Management (BLM)-administered lands. Onsite controls and services are present, but harmonize with the natural environment. Majority of services are provided by the Wyoming State Parks and USFS.

**MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS**

**Recreation and Visitor Services Program:**

- Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
- Implement closures to mechanized and motorized travel (Alternative B only).
- Mechanized and motorized travel limited to designated roads and trails (alternatives A and C).
- Work with local climbing community and adjacent land management agencies to maintain this area.
- Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information.
- Engage local sporting good businesses and other partners in the development and distribution of a brochure and/or area guide book.
- Some onsite visitor orientation (kiosk and trail markers) will be developed.
- A memorandum of understanding will be developed between the BLM and pertinent partners such as local sporting goods retailers, Wyoming State Parks, the National Outdoor Leadership School, and an established friends group or club.
- The BLM and other partners will provide matching contributions when funding and labor pool allows.
- Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through customer assessments (focus group interviews or visitor studies).
- Monitor recreation setting condition through onsite patrols.

**Other Programs:**

- No Surface Occupancy for Oil and Gas Development (alternatives A, B, and D)
- Closed to Geothermal Development (alternatives A, B, and D)
- Closed to Geophysical Exploration (alternatives A, B, and D)
- Closed To Material Sales and Free Use Permits (alternatives A, B, and D)
- New rights-of-ways are excluded (alternatives A, B, and D)
- Renewable Energy Development is excluded (alternatives A, B, and D)
- Petition to withdrawal from entry under the 1872 Mining Law (Alternative B)
- The SRMA is managed as a Class II Visual Resource (alternatives A, B, and D)
- Mineral entry requires a Plan of Operations (alternatives A and D)
- Closed to motorized vehicle use (alternatives B and D)
- Motorized use limited to designated roads (Alternative A)
- Mechanized use limited to designated roads and trails (Alternative B)

| IMPLEMENTATION DECISIONS |
|---|
| Implementation Decisions: (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.) |

## Table C.13. The Bus @ Baldwin Creek Recreation Management Zone

| SUPPORTING INFORMATION |
|---|
| This Special Recreation Management Area (SRMA) is necessary to accommodate local visitor demand for close to home nonmotorized recreation opportunities in the Lander area; this demand has been identified by onsite customers and through community involvement workshops. The public lands in this area are located within walking and pedal biking distance from the town of Lander. The area currently provides a limited amount of nonmotorized trail opportunities, with diverse and appealing topography, and some slick rock formations. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. |
| **SRMA/RECREATION MANAGEMENT ZONE (RMZ) OBJECTIVE(S) DECISIONS** |
| The Bus @ Baldwin Creek RMZ of the Lander Valley Community SRMA will be sustained or enhanced for nonmotorized recreationists to engage in horseback riding, hiking, trail running, and mountain biking, so that participants in visitor assessments/surveys report a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:<br><br>**Activities:** Horseback riding, Trail running, Mountain biking, and Hiking.<br><br>**Experiences:** Enjoying having easy access to natural landscapes, Enjoying exercise and physical fitness, Enjoying closeness of friends and family, Enjoying having access to close to home outdoor amenities, and Feeling that this community is a special place to live.<br><br>**Benefits:** Improved mental and physical health, Greater connection to nature, Greater sense of place, Stronger ties with family and friends, Heightened sense of satisfaction with our community, and Reduced adverse human impacts such as litter, vegetative trampling, and unplanned trails. |
| **RECREATION SETTING CHARACTERISTIC DESCRIPTIONS** |
| **Physical Characteristics:** Majority of the area is on or near improved country roads, but at least ½ mile from any highways. Natural setting may have subtle modifications that would be noticed but not draw the attention of the casual observer wandering through the area. Trails may exist but do not exceed standard and density to carry expected use. Facilities and structures are rare and isolated.<br><br>**Social Characteristics:** Usually 3-6 encounters per day off travel routes and 7-15 encounters per day on travel routes. Usually group size is small.<br><br>**Operational Characteristics:** Excluding county roads, adjacent housing development access roads, and livestock permittee access to range improvements; the area will be managed for nonmotorized use. Onsite controls and services are present, but harmonize with the natural environment. |
| **MANAGEMENT ACTIONS AND ALLOWABLE USE DECISIONS** |
| **Recreation and Visitor Services Program:**<br>● Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.<br>● Implement closures to motorized vehicle use; utilize administrative access agreements to allow for the maintenance of range improvements.<br>● Mechanized use will be limited to designated roads and trails; these trails will be identified through the environmental assessment process in consideration of recommendations from partners such as the state land board, the grazing permittees, an established friends group or club, and other stakeholders or members of the public.<br>● Facility and trail development will focus on sufficient densities and developments to provide for a ¼ day (2-4 hours) of use.<br>● Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information.<br>● Engage local sporting good businesses and other partners in the development and distribution of a brochure and/or area guide book.<br>● Some onsite visitor orientation (kiosk and trail markers) will be developed. |

- This RMZ will be managed in a custodial fashion, until which time that a 'friends group' or local club demonstrates a willingness to be involved in the management and stewardship of the site.
- A memorandum of understanding (MOU) will be developed between the Bureau of Land Management (BLM) and pertinent partners such as the Wyoming State Land Board, livestock grazing permittees, local sporting good retailers, and an established friends group or club.
- The MOU will assign responsibility for the stewardship and development of the site and related amenities; the majority of cost and labor responsibilities associated with initial investments and maintenance of the identified trails and related amenities will be born upon the established friends group or club.
- The BLM and other partners will provide matching contributions when funding and labor pool allows.
- Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through customer assessments (focus group interviews or visitor studies).
- Monitor recreation setting condition through onsite patrols May-November.

**Other Programs:**

- No Surface Occupancy for Oil and Gas Development (alternatives A, B, and D)
- Closed to Geothermal Development (alternatives A, B, and D)
- Closed to Geophysical Exploration (alternatives A, B, and D)
- Closed To Material Sales and Free Use Permits (alternatives A, B, and D)
- New rights-of-ways are excluded (alternatives B and D)
- Co-locate new rights-of-way whenever possible (Alternative A)
- Renewable Energy Development is excluded (alternatives B and D)
- Petition to withdrawal from entry under the 1872 Mining Law (Alternative B)
- Mineral entry requires a Plan of Operations (alternatives A and D)
- Closed to motorized vehicle use (alternatives B and D)
- Motorized use limited to designated roads (alternatives A and C)
- Mechanized use limited to designated roads and trails (Alternative B)

**IMPLEMENTATION DECISIONS**

Implementation Decisions: (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.)

# National Historic Trails Destination Special Recreation Management Area (Alternatives B and D)

### Table C.14. National Historic Trails Auto Tour Route Recreation Management Zone

**SUPPORTING INFORMATION**

This Special Recreation Management Area (SRMA) is necessary to accommodate regional visitor demand for destination oriented Congressionally Designated Trail opportunities in a safe and facility rich environment; this demand has been identified by onsite customers, through community involvement workshops, visitor surveys, and through the enabling legislation of the National Historic Trails. The area contains four Congressionally Designated Trails including: Oregon, Mormon Pioneer, Pony Express, and California National Historic Trails. The area is currently used for intensive motorized oriented interpretation/wayside exhibits and therefore has the infrastructure and administrative support to accommodate this demand. SRMA management will maintain and enhance these amenities.

**SRMA/RECREATION MANAGEMENT ZONE (RMZ) OBJECTIVE(S) DECISIONS**

The Auto Tour Route RMZ will be sustained or enhanced for highway travelers to engage in historic site visitation/learning, teaching history, photography, and driving for pleasure so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:

**Activities:** Cultural site visitation, Learning cultural heritage, Teaching cultural heritage, Photography, and Driving for pleasure.

**Experiences:** Enjoying the closeness of friends and family, Learning more about the cultural heritage here, Having others nearby who could help you if needed, and Sharing Wyoming's cultural heritage with new people.

**Benefits:** Enjoying easy access to cultural and historic sites, Stronger ties with family and friends, Increased appreciation of the areas cultural history, Greater household awareness of and appreciation of our cultural heritage, Greater protection of area historic structures and archeological sites, and Sustainability of community's cultural heritage, Increased local tax revenue from visitors.

**RECREATION SETTING CHARACTERISTIC DESCRIPTIONS**

**Physical Characteristics:** Majority of the area is on or near primary highways, but still within a rural area. Natural setting may have modifications that range from being easily noticed to strongly dominant to observers. These alterations would remain visually subordinate from sensitive travel routes and use areas.

Paved, improved, and/or primitive roads/highways as well as nonmotorized trails dominate the landscape. Facilities and structures are readily apparent and may range from scattered to small dominant clusters.

**Social Characteristics:** People seem to be everywhere, but human contact remains intermittent.

**Operational Characteristics:** Ordinary highway auto and truck traffic is characteristic. Controls and services obvious and numerous. Largely harmonize with the man-made environment.

**MANAGEMENT ACTIONS AND ALLOWABLE USE DECISIONS**

**Recreation and Visitor Services Program:**

- Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
- Work with partners and other agencies to continue maintenance of existing sites.
- Work with partner entities and the Wyoming State Historic Preservation Office to sustainably develop areas where new sites are needed to deliver targeted outcomes.
- The Bureau of Land Management (BLM) and partners will review (using the BLM's contrast rating system) existing facilities and interpretive exhibits to ensure designs harmonize with the characteristic landscape; designs out of character with the landscape will be modified so as not to overpower the landscape.
- Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information.
- Utilize promotion to focus the majority of trail orientated users into this RMZ.
- Partner with education institution or local museum to develop an interpretive plan to ensure existing interpretation is accurate and delivers a consistent message.
- Coordinate with the National Park Service (NPS) to continue publishing "National Historic Trails Auto Tour Route Interpretive Guide Across Wyoming."
- Utilize promotion to tie this RMZ in with campground facilities in the Green Mountain Extensive Recreation Management Area; as well as available amenities in the Fremont County area.
- Ensure promotion of the area reaches interested user segments by piggyback marketing the RMZ with NPS marketing for Yellowstone National Park.
- Partner with National Historic Trails Center and other local museums to develop displays to demonstrate to potential visitors the opportunities that are available within the RMZ and similar management RMZs within the BLM Casper Field Office.
- The BLM will focus motorized trail orientated special recreation permits and trail interpretation in this RMZ.
- Additional administrative actions will be applied as needed to reduce unplanned visitor impacts (vandalism, social trails, litter etc.).
- Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through customer assessments (focus group interviews or visitor studies), monitor recreation setting condition through onsite patrols June-September.

**Other Programs:**

- The SRMA will be managed as a Class II Visual Resource.
- Additional Allowable Use Decisions for the National Historic and Scenic Trails are contained in Table 2.33, "7000 Special Designations (SD) – Congressionally Designated Trails" (p. 191).

**IMPLEMENTATION DECISIONS**

**Implementation Decisions:** (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.)

## Table C.15. Group Use Recreation Management Zone

**SUPPORTING INFORMATION**

This Special Recreation Management Area (SRMA) is necessary to accommodate regional visitor demand for destination oriented Congressionally Designated Trail reenactment opportunities in semi-arid sagebrush step regions; this demand has been identified by onsite customers, through community involvement workshops, visitor surveys, and through the enabling legislation of the National Historic Trails. The area contains four Congressionally Designated Trails including: Oregon, Mormon Pioneer, Pony Express, and California National Historic Trails. The area is currently used for intensive nonmotorized reenactments and therefore has the infrastructure and administrative support to accommodate this demand. SRMA management will maintain and enhance these amenities.

**SRMA/RECREATION MANAGEMENT ZONE (RMZ) OBJECTIVE(S) DECISIONS**

The Group Reenactment RMZ of the National Historic Trails Destination SRMA will be sustained or enhanced for organized groups and other trail enthusiasts to engage in physically demanding cultural site visitation/learning, photography, and historic reenactments, so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:

**Activities:** Cultural site visitation, Learning cultural heritage, Teaching cultural heritage, Photography, and Historic reenactment.

**Experiences:** Develop personal and spiritual values, Reflect on personal values, Gaining an experience I can look back on, and Teach and learn about history here.

**Benefits:** Increased opportunities for youth, Greater spiritual growth, Greater appreciation of cultural histories, Increased understanding of history, Stronger ties with family and friends, Greater household awareness of and appreciation of our cultural heritage, Protection of cultural sites, Maintenance of distinctive historical recreation setting, and Reduced human impacts such as: litter, vegetation trampling, and unplanned trails.

**RECREATION SETTING CHARACTERISTIC DESCRIPTIONS**

**Physical Characteristics:** The majority of this route is on or near 4-wheel drive roads, but at least ½ mile from all improved roads, though they may be in sight. Natural setting may have subtle modifications that would be noticed, but not draw the attention of an observer wandering through the area. Primitive motorized routes and nonmotorized trails may exist, facilities and structures are rare and often accessible via unimproved routes.

**Social Characteristics:** Average group size and encounters per day are detailed in the 2005 Finding of No Significant Impact/Decision Record for Handcart Trekking.

**Operational Characteristics:** 4-wheel drive vehicles, all-terrain vehicles, dirt bikes, or over-snow vehicles in addition to nonmotorized mechanized use when the trail is on existing roads. Motorized vehicles are not allowed on Rocky Ridge. Vehicle use on the National Historic Trail in support of Special Recreation Permits will be limited. Onsite controls and services are low; primarily offsite. Minimum amount necessary to achieve planning objectives.

**MANAGEMENT ACTIONS AND ALLOWABLE USE DECISIONS**

**Recreation and Visitor Services Program:**

- Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
- Permanently close trail section over Rocky Ridge to motorized use.
- Motorized and mechanized travel in the remainder of the SRMA will be limited to existing roads and trails.
- The Bureau of Land Management (BLM) and partners (State Historic Preservation Office and National Park Service) will review (using the BLM's contrast rating system) interpretive exhibits to ensure designs harmonize with the characteristic landscape; designs out of character with the landscape will be modified so as not to overpower the landscape.
- Group use in the area is directed and managed through the 2005 Finding of No Significant Impact/Decision Record for Handcart Trekking.
- No competitive events will be authorized in this RMZ.
- Additional administrative actions will be applied as needed to reduce unplanned visitor impacts (vandalism, social trails, litter etc.).
- Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information.
- Utilize promotion to educate users on the physically demanding nature of this RMZ.
- Partner with education institution or local museum to develop an interpretive plan to ensure existing interpretation is accurate and delivers a consistent message.
- Review all interpretation to ensure all site-specific stories are told (Oregon Trail, Pony Express, etc.).
- Provide replacement/offsite interpretation opportunities for visitors physically unable to access motorized vehicle closure of Rocky Ridge, this site may be an interpretation panel or set of panels overlooking Rocky Ridge in close proximity to an improved motorized route.
- Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through customer assessments (focus group interviews or visitor studies), monitor recreation setting condition through onsite patrols June-September.
- With stakeholder involvement, apply Limits of Acceptable Change to ensure protection of the Historic Trail Resource. Limits of Acceptable Change focuses on a cycle of designing-implementing-monitoring-evaluating-adjusting actions to respond to future recreation issues and the results of monitoring.

**Other Programs:**

- The SRMA will be managed as a Class II Visual Resource.
- Additional Allowable Use Decisions for the National Historic and Scenic Trails are contained in Table 2.33, “7000 Special Designations (SD) – Congressionally Designated Trails” (p. 191).

**IMPLEMENTATION DECISIONS**

**Implementation Decisions:** (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.)

# Sweetwater Canyon Undeveloped Special Recreation Management Area (Alternatives B and D)

## Table C.16. Sweetwater Canyon Recreation Management Zone

**SUPPORTING INFORMATION**

This Special Recreation Management Area (SRMA) is necessary to accommodate local visitor demand for undeveloped/back country opportunities in semi-arid sagebrush step regions; this demand has been identified by onsite customers and through community involvement workshops. The canyon waterway is a designated Wilderness Study Area (WSA) and considered for inclusion as a Wild and Scenic River. The area also provides spectacular scenic canyon walls, numerous wildlife species, high quality trout fishing, and opportunities for solitude. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

**SRMA/RECREATION MANAGEMENT ZONE (RMZ) OBJECTIVE(S) DECISIONS**

The Sweetwater Canyon Undeveloped SRMA will be sustained or enhanced for back country enthusiasts to engage in hiking, backpacking, fishing, horseback riding, hunting, and wildlife viewing so that participants in visitor assessments/surveys report a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:

**Activities:** Hiking/backpacking, Horseback riding, Hunting, Fishing, and Wildlife viewing.

**Experiences:** Enjoying the sensory experience of a natural landscape, Feeling good about solitude, Being isolated and independent, and Enjoying an escape from crowds of people.

**Benefits:** Enhanced awareness and understanding of nature, Improved appreciation of nature, Greater connection to nature, Improved opportunity to view wildlife close up, Better understanding of wildlife's contribution to my quality of life, Greater sense of place, Reduced human impacts such as litter, vegetative trampling, and unplanned trails, Increased awareness and protection of natural landscapes, Enhanced ability for visitors and residents to find areas providing desired recreation experiences and benefits, and Maintenance of community's distinctive recreation tourism market.

**RECREATION SETTING CHARACTERISTIC DESCRIPTIONS**

**Physical Characteristics:** Implement motorized vehicle closures to enhance back country setting. Essentially an unmodified natural environment. Evidence of humans is unnoticed by an observer wandering through the area. Trails may exist but do not exceed standard to carry expected use. Facility and structures are extremely rare, and are located in disturbed (e.g., roaded or front country) areas.

**Social Characteristics:** Usually 3-6 encounters per day off travel routes (e.g., campsites) and 7-15 encounters per day on travel routes. Usual group size is small.

**Operational Characteristics:** Access to this area utilizes routes identified as open for 4-wheel drive vehicles, all-terrain vehicles, or dirt bikes, in addition to nonmotorized mechanized routes. A large portion of this area (WSA and inaccessible portions) does not provide for any motorized or mechanized use. Onsite controls and services are low; primarily offsite. Minimum amount necessary to achieve planning objectives.

**MANAGEMENT ACTIONS AND ALLOWABLE USE DECISIONS**

**Recreation and Visitor Services Program:**

- Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
- Implement route closures within the WSA to motorized and mechanized vehicles.
- 
- The WSA will be closed to organized group and competitive event Special Recreation Permits.
- Other Special Recreation Permits will be limited as necessary to reach and maintain desired future setting condition
- A foot/horseback trail may eventually need to be developed or identified (from existing trails within the area) to ensure resource protection. Additional trails may also be added to connect the main trail to additionally identified access points.
- Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information.
- Engage local sporting good businesses and other partners to ensure promotional material does not over advertise the area.
- Some onsite visitor orientation (kiosk and signs) may be developed.
- Consider the use of a memorandum of understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance this areas unique natural setting.
- Work with the Wyoming Game and Fish Department and other interested entities to maintain and enhance terrestrial and aquatic habitat in the area.
- Solicit partnerships to ensure adequate maintenance of the areas signs and fences.
- Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through customer assessments (focus group interviews or visitor studies).
- Monitor recreation setting condition through onsite patrols.

**Other Programs:**

- The WSA is managed under BLM Manual 6330, *Management of Wilderness Study Areas*
- The WSA is managed as a Class I Visual Resource (all alternatives)
- Closed to Livestock Grazing (Alternative B)
- Closed to Motorized and Mechanized Travel (Alternative B)

| IMPLEMENTATION DECISIONS |
|---|
| **Implementation Decisions:** (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.) |

# Sweetwater Rocks Undeveloped Special Recreation Management Area (Alternatives B and D)

### Table C.17. Sweetwater Rocks Recreation Management Zone

| SUPPORTING INFORMATION |
|---|
| This Special Recreation Management Area (SRMA) is necessary to accommodate local visitor demand for undeveloped/back country opportunities in semi-arid sagebrush step regions; this demand has been identified by onsite customers and through community involvement workshops. The Sweetwater Rocks contain 4 designated Wilderness Study Area (WSA). The area also provides spectacular scenic granite formations, numerous wildlife species, high quality climbing, and opportunities for solitude. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. |
| **SRMA/RECREATION MANAGEMENT ZONE (RMZ) OBJECTIVE(S) DECISIONS** |
| The Sweetwater Rocks Undeveloped SRMA will be sustained or enhanced for back country enthusiasts to engage in hiking, backpacking, climbing, horseback riding, hunting, and wildlife viewing, so that participants in visitor assessments/surveys report a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes below:<br><br>**Activities:** Climbing, Hiking/backpacking, Horseback riding, Hunting, and Wildlife viewing.<br><br>**Experiences:** Developing skills and abilities, Enjoying having access to hands on environmental learning, Enjoying the sensory experience of a natural landscape, Feeling good about solitude, being isolated and independent, and Enjoying teaching others about the outdoors.<br><br>**Benefits:** Improved leadership abilities, Improved outdoor knowledge and self confidence, Enhanced awareness and understanding of nature, Improved appreciation of nature, Greater connection to nature, Improved opportunity to view wildlife close up, Greater respect for private property and local lifestyles, Greater sense of place, Improved outdoor recreation skills, Reduced human impacts such as litter, vegetative trampling, and unplanned trails, Improved respect for privately owned lands, Increased awareness and protection of natural landscapes, Enhanced ability for visitors and residents to find areas providing desired recreation experiences and benefits, Maintenance of community's distinctive recreation tourism market, and Greater value added service industry. |
| **RECREATION SETTING CHARACTERISTIC DESCRIPTIONS** |
| **Physical Characteristics:** Implement motorized vehicle closures to enhance back country setting. Essentially an unmodified natural environment. Evidence of humans is unnoticed by an observer wandering through the area. Trails may exist but do not exceed standard to carry expected use. Facility and structures are extremely rare, and are located in disturbed (e.g., roaded or front country) areas.<br><br>**Social Characteristics:** Usually 3-6 encounters per day off travel routes (e.g., campsites) and 7-15 encounters per day on travel routes. Usual group size is small.<br><br>**Operational Characteristics:** Access to this area utilizes routes identified as open for 4-wheel drive vehicles, all-terrain vehicles, or dirt bikes, in addition to nonmotorized mechanized routes. A large portion of this area (WSAs and inaccessible portions) do not allow for any mechanized use. Onsite controls and services are low; primarily offsite. Minimum amount necessary to achieve planning objectives. |
| **MANAGEMENT ACTIONS AND ALLOWABLE USE DECISIONS** |

**Recreation and Visitor Services Program:**

- Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
- Implement route closures within the WSA to motorized and mechanized vehicles
- The Bureau of Land Management (BLM) will work with local landowners, the Access Fund, Friends of Sweetwater Rocks, local sporting goods retailers, and the National Outdoor Leadership School to pursue land trades, acquisitions or easement in and around this RMZ to facilitate better nonmotorized access.
- Partners will also emphasized the importance of: getting landowner permission before crossing any and all private lands, abiding by Wyoming State land restrictions on overnight camping, and increasing understanding of land ownership patterns in the area.
- Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information.
- Engage local sporting good businesses and other partners to ensure promotional material does not over advertise the area.
- Some onsite visitor orientation (kiosk and signs) may be developed.
- A memorandum of understanding (MOU) will be developed between the BLM and willing/pertinent partners such livestock grazing permittees, local sporting good retailers, the friends of Sweetwater Rocks, the National Outdoor Leadership School, the Wyoming State Land Board, the Access Fund, the Nature Conservancy, and private landowners.
- The MOU will emphasize the desires to maintain this areas unique natural setting while also ensuring protection of private property rights. The BLM will work cooperatively with all partners to pursue improved nonmotorized access.
- Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through customer assessments (focus group interviews or visitor studies).
- Monitor recreation setting condition through onsite patrols.

**Other Programs:**

- All WSAs are managed consistent with BLM Manual 6330, *Management of Wilderness Study Areas*
- Manage as a Class 1 Visual Resource
- Closed to motorized and mechanized vehicles in the WSA (Alternative B)
- Detailed management of the area outside of the WSA is detailed in Table 2.32, "6000 Land Resources (LR) – Recreation" (p. 178).

**IMPLEMENTATION DECISIONS**

**Implementation Decisions:** (e.g., the land use plan decision may be to designate overnight camping areas while the supporting implementation decisions would address specific site locations, size, and amenities to be provided.)

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# Appendix D. Reclamation Objectives and Standards

Reclamation will be required for any surface-disturbing activity occurring on public lands. A reclamation plan appropriate in detail and complexity and tailored to a specific surface-disturbing activity will be required for this activity. This appendix details the reclamation objectives and standards necessary to achieve a timely and proper recovery according to management objects of the disturbed site and is consistent with the Wyoming Reclamation Policy.

The reclamation plan will provide comprehensive as well as detailed site-specific reclamation procedures, methods and actions to successfully meet the objectives and standards for any surface disturbance. The reclamation plan will also include sufficient monitoring requirements and reports to ensure reclamation success has been accomplished. Site-specific reclamation plans will identify the dominant Ecological Site Descriptions, referenced plant communities, and soil map units. The approved reclamation plan must adhere to federal, state and local requirements, which can be used by regulatory agencies in their oversight roles to ensure that the reclamation measures are implemented, are appropriate for the site, meet area resource objectives (such as for wildlife, including greater sage-grouse), and are ecologically functional.

Limited Reclamation Potential (LRP) areas as identified in the LRP Map (Map 11) will require site-specific measures in the reclamation plan and will address the critical characteristics associated with these sites. These critical characteristics include but are not limited to soil erosivity, chemical and physical soil restrictive characteristics, steep slopes, and inadequate affective precipitation.

Project level reclamation objectives and standards will be established prior to disturbance and must be consistent with the objective set forth. The objectives and standards may be modified by the Authorized Officer if site-specific situations are deemed necessary to meet the overall land management objectives. To ensure objectives are being met, they will identify metrics, with triggers such as plant composition, percent cover, or other site-specific factors. Reclamation objectives are as follows:

- The objective of interim reclamation in the Designated Development Areas (DDAs) is to rehabilitate disturbed sites during the interim phase of development to achieve landscape continuity, minimize non-designated invasive species, and stabilize the soil. Interim reclamation will emphasize native plant species and will be designed to minimize re-disturbance during final reclamation activities and to initiate and accelerate ecological succession.

- Nonnative plants are permissible only as an approved short-term and non-persistent alternative to native plant materials. Nonnatives will not hybridize, displace, or offer long-term competition to the endemic plants, and are designed to aid in the reestablishment of native plant communities.

- The objective of interim reclamation in non-DDAs is to rehabilitate disturbed sites during the interim phase of development to achieve landscape continuity, minimize non-designated invasive species, and stabilize the soil and to promote a diversified plant community with the end result of accelerating the vegetative successional process to meet wildlife habitat goals. Interim reclamation will emphasize native plant species and will be designed to minimize

re-disturbance during final reclamation activities and to initiate and accelerate ecological succession.

- The objective of final reclamation in DDAs is to rehabilitate disturbed sites to achieve landscape continuity, minimize non-designated invasive species, and provide for a stabilized ecologically diverse plant community. Final reclamation is successful when a state of ecological progressive succession is achieved which can eventually advance to full ecosystem restoration.

- The objective of final reclamation in the non-DDAs is to reclaim disturbed sites to achieve landscape continuity, minimize non-designated invasive species, and provide for a stabilized ecologically diverse plant community, which will support approximately similar composition and density of organisms that were originally present. Final reclamation is successful when a state of ecological progressive succession is achieved which can eventually advance to full ecosystem restoration.

- During predisturbance onsites, the Natural Resources Conservation Service Ecological Site Descriptions will be determined, and the operator may explain why a Vegetation Reference Area might be more appropriate for use than the Ecological Site Descriptions, and whether a return to baseline condition is appropriate. The reclamation standard to be applied in determining if interim or final reclamation has been achieved will be part of the National Environmental Policy Act analysis of the action, and the Vegetation Reference Area will be part of at least one alternative analyzed, if requested by the operator.

| **Interim Reclamation Standards for Designated Development Areas**<br>Reclamation will be considered successful 3 years after seeding if the following criteria are met: | |
|---|---|
| **Site Characteristics** | **Standards** |
| Percent Ground Cover | 80 percent of the Erosion indicator as listed on NRCS Reference Sheet for Ecological Site is met |
| Plant Species Composition (by weight) | ● At least 65 percent total plant species must be from major grasses, forbs and/or shrubs listed in the Ecological Site Desired Plant Community and/or BLM authorized plant species from seeding mix<br>● No greater than 15 percent of the total reclaimed disturbance will be composed of non-designated invasive species<br>● No greater than 35 percent of a 500 square foot contiguous area within a reclaimed disturbance will be composed of non-designated invasive species<br>● No designated federal and state invasive plant species present |
| Site Stability, Erosion Potential, and other Variables | Meet NRCS Reference Sheet Indicators for Ecological Site with the following exceptions:<br>● Soil Surface Structure and Soil Organic Matter content<br>● Average Percent of Litter Cover and Depth<br>● Expected Annual Production<br>● Functional/Structural Groups |
| BLM Bureau of Land Management<br>NRCS Natural Resources Conservation Service | |

| **Interim Reclamation Standards for non-Designated Development Areas**<br>Reclamation will be considered successful 5 years after seeding if the following criteria are met: | |
|---|---|
| **Site Characteristics** | **Standards** |
| Percent Ground Cover | At least 90 percent of the Erosion indicator as listed on NRCS Reference Sheet for Ecological Site is met |
| Plant Species Composition (by weight) | ● At least 75 percent total plant species must be from major grasses, forbs and shrubs listed in the Ecological Site Desired Plant Community and/or BLM authorized plant species from seed mix<br>● At least 5 percent of the total plant species must be woody plants as listed in the Ecological Site Desired Plant Community<br>● At least 5 percent of the total plant species must be forbs as listed in the Ecological Site Desired Plant Community<br>● No greater than 15 percent of the total reclaimed disturbance will be composed of non-designated invasive species<br>● No greater than 35 percent of a 500 square foot contiguous area within a reclaimed disturbance will be composed of non-designated invasive species<br>● No designated federal and state invasive plant species present |
| Site Stability, Erosion Potential, and other Variables | Meet NRCS Reference Sheet Indicators for Ecological Site with the following exceptions:<br>● Soil Surface Structure and Soil Organic Matter content<br>● Average Percent of Litter Cover and Depth<br>● Expected Annual Production<br>● Functional/Structural Groups |
| BLM Bureau of Land Management<br>NRCS Natural Resources Conservation Service | |

| **Final Reclamation Standards for Designated Development Areas**<br>Reclamation will be considered successful after receipt of project abandonment if the following criteria are met: | |
|---|---|
| **Site Characteristics** | **Standards** |
| Percent Ground Cover | 90 percent of the Erosion indicator as listed on NRCS Reference Sheet for Ecological Site is met |
| Plant Species Composition (by weight) | ● At least 80 percent total plant species must be from major grasses, forbs and/or shrubs listed in the Ecological Site Desired Plant Community and/or BLM authorized plant species from seeding mix<br>● At least 5 percent of the total plant species must be woody plants as listed in the Ecological Site Desired Plant Community<br>● At least 5 percent of the total plant species must be forbs as listed in the Ecological Site Desired Plant Community<br>● No greater than 10 percent of the total reclaimed disturbance will be composed of non-designated invasive species<br>● No greater than 25 percent of a 500 square foot contiguous area within a reclaimed disturbance will be composed of non-designated invasive species<br>● No designated federal and state invasive plant species present |
| Site Stability, Erosion Potential, and other Variables | Meet NRCS Reference Sheet Indicators for Ecological Site with the following exceptions:<br>● Soil Surface Structure and Soil Organic Matter content<br>● Average Percent of Litter Cover and Depth<br>● Expected Annual Production<br>● Functional/Structural Groups |
| BLM Bureau of Land Management<br>NRCS Natural Resources Conservation Service | |

| **Final Reclamation Standards for non-Designated Development Areas**<br>Reclamation will be considered successful after receipt of project abandonment if the following criteria are met: | |
|---|---|
| **Site Characteristics** | **Standards** |
| Percent Ground Cover | 100 percent of the Erosion indicator as listed on NRCS Reference Sheet for Ecological Site is met |
| Plant Species Composition (by weight) | ● At least 85 percent of total plant species must be from dominate grasses, forbs and woody plants listed in the Ecological Site Desired Plant Community and/or BLM authorized plant species from seed mix<br>● All major grasses must be present<br>● Major woody plant species will meet minimum percentage and/or total woody plants present will meet minimum percentage of growth form characteristics listed in the Ecological Site Desired Plant Community.<br>● At least 3 of the listed forb must be present and at least 5 percent of the total plant species must be forbs as listed in the Ecological Site Desired Plant Community<br>● No greater than 5 percent of the total reclaimed disturbance will be composed of non-designated invasive species<br>● No greater than 15 percent of a 500 square foot contiguous area within a reclaimed disturbance will be composed of non-designated invasive species<br>● No designated federal and state invasive plant species present |
| Site Stability, Erosion Potential, and other Variables | Meet NRCS Reference Sheet Indicators for Ecological Site with the following exceptions:<br>● Soil Surface Structure and Soil Organic Matter content<br>● Average Percent of Litter Cover and Depth<br>● Expected Annual Production<br>● Functional/Structural Groups |
| BLM Bureau of Land Management<br>NRCS Natural Resources Conservation Service | |

Monitoring of reclaimed areas will be required and will ensure reclamation standards have been met. Reclaimed areas will be monitored annually by project proponent or BLM personnel if designated in the reclamation plan. Reclamation monitoring protocol will be included in the reclamation plan as approved by BLM.

Reclamation monitoring will be documented in an annual reclamation report submitted to the Authorized Officer by December 31 of each year after one full growing season following seeding. The report will document all aspects of the following:

- The 10 requirements of the Wyoming Reclamation Plan;
- The requirements of the Resource Management Plan reclamation objectives and standards;
- Requirements of the Onshore Oil and Gas Orders;
- Identify whether the reclamation objectives and standards are likely to be achieved in the near future without additional actions; and
- Identify actions that have been or will be taken to meet the objectives and standards.

The report will also include acreage figures for the following:

- Initial disturbed acres;
- Successful Interim Reclaimed Acres; and/or
- Successful Final Reclaimed Acres.

Annual reports will not be submitted for approval by the Authorized Officer as having fully met interim or final reclamation standards. Any time 15 percent or more of an interim reclaimed area is re-disturbed, monitoring will be reinitiated. Actions will be taken to ensure that reclamation

standards are met as quickly as reasonably practical. The Authorized Officer will be notified in a separate document by the project proponent when the reclamation operations have been completed that indicate the site meets reclamation standards and is ready for final inspection.

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# Appendix E. Exception, Modification, and Waiver Criteria, Avoidance Criteria, and Special Management for Designated Corridors

## E.1. Introduction

This appendix addresses the procedure for providing exceptions, modifications, and waivers of stipulations or Conditions of Approval (COAs) placed on oil and gas leases and other surface disturbance and disruptive activity authorizations, and avoidance criteria for rights-of-way (ROWs), to protect resource values identified in Chapter 3. These values generally include wildlife, soil, water, recreation, visual, and cultural resources. Criteria applicable to designated corridors are provided.

**Oil and Gas**

The Bureau of Land Management (BLM) may apply stipulations or COAs identified in the Standard Oil and Gas Stipulations (Appendix N (p. 1601)) and the Wyoming BLM Mitigation Guidelines for Surface-Disturbing and Disruptive Activities (Appendix M (p. 1595)). Oil and gas leases will have applicable stipulations attached at the leasing stage. For surface-disturbing and disruptive activities occurring within Designated Development Areas (DDAs), stipulations will be reviewed during the National Environmental Policy Act (NEPA) process and will not be applied unless required to follow federal laws and policies or the BLM identifies a site-specific real-time need for the stipulation. Review of requests for exception within DDAs will be expedited. Refer to Appendix I (p. 1535) for the application of stipulations or COAs inside and outside of DDAs.

The three types of surface stipulations the BLM applies are (1) no surface occupancy (NSO), (2) timing limitation stipulation (TLS), and (3) controlled surface use (CSU). The surface stipulations are defined below.

- **No Surface Occupancy:** Areas closed to placement of surface facilities such as roads, oil and gas wells, and other facilities. This stipulation may be applied to oil and gas leases only before a lease is issued.
- **Timing Limitation Stipulation:** Areas closed to construction and development activities during identified timeframes. The alternatives vary in the application of TLSs to maintenance activities, including associated vehicle travel, during the closed period unless otherwise specified in the stipulation.
- **Controlled Surface Use:** Areas where surface uses are subject to specified controls or constraints.

The BLM cannot apply an NSO stipulation after oil and gas lease issuance, but can apply TLS and CSU restrictions as COAs after the oil and gas lease has been issued.

An applicant can request an exception, modification, or waiver of a NSO, TLS, or CSU stipulation or a COA. This document identifies the criteria that the BLM would utilize in making the

determination to except, modify, or waive the stipulation or COA. The Resource Management Plan (RMP) serves as the vehicle for providing analysis of the conditions under which waivers, exceptions, or modifications of lease stipulations or COAs may be granted.

A request for exception must be initiated in writing before the time that the work was originally proposed to conclude. The unpredictability of weather, animal movement and condition, etc., precludes analysis of requests related to wildlife far in advance of the time periods in question. However, where possible, the applicant should seek the exception at least two-weeks in advance. Analyses of a request include review of potential mitigation measures and alternatives (e.g., traffic restrictions, alternative scheduling, and staged activity). The request is considered as a unique action and is analyzed and documented individually for RMP and NEPA compliance.

Exception requests will not be granted for stipulations or operating standards designed to protect threatened and endangered species, unless the BLM consults with the U.S. Fish and Wildlife Service (USFWS) and reinitiates consultation, if appropriate.

## E.2. Exceptions, Modifications, and Waivers

An applicant may request an exception, modification, or waiver of a stipulation or restriction included in a lease or applied as a COA, as defined below.

- **Exception:** A one-time exemption to a lease stipulation or COA determined on a case-by-case basis.
- **Modification:** A change to the provisions of a lease stipulation, either temporarily or for the term of the lease.
- **Waiver:** A permanent exemption to a lease stipulation.

The person requesting the exception, modification, or waiver is encouraged to submit information that might assist the authorized official in making a decision. The Authorized Officer reviews information submitted in support of the request and other pertinent information. The Authorized Officer may modify, waive, or grant an exception to a stipulation if:

- The action is consistent with federal laws.
- The action is consistent with the RMP.
- The management objectives that led the BLM to require the lease stipulation can be met without restricting operations in the manner provided for by the stipulation given changes in the condition.
- The action and the impacts that would result are acceptable to the Authorized Officer based on a review of the environmental consequences.

## E.3. Standard Exception

An exception may be granted by the Authorized Officer if it can be demonstrated that the ground-disturbing activity/lease stipulation would not cause adverse impacts to the targeted resource, condition, or public interest as defined by RMP objectives, standards, or conditions and:

1. is intended to improve the targeted resource, condition, or public interest (e.g., vegetation treatment in a NSO area to improve wildlife habitat, trail construction in a NSO/CSU area for a Special Recreation Management Area (SRMA) to improve recreational opportunities), or

2. the ground-disturbing activity (mentioned above), by its nature, must be done within the targeted NSO/CSU area (e.g., spring development within a NSO area for riparian-wetland vegetation, installation of brook trout stream barrier in a NSO area for cutthroat trout, or short duration road maintenance).

In situations where a ground-disturbing activity/lease stipulation is excepted, the activity could be subject to additional COAs, reclamation measures, or best management practices. Measures applied will be based on the nature, extent, and values potentially affected by the ground-disturbing activity. Excepted ground-disturbing activities/lease stipulations are given on a one-time case-by-case basis and would not necessarily constitute subsequent approvals.

# E.4. Resource Specific Exceptions

## E.4.1. Wildlife

Activities within the planning area are managed with stipulations or COAs to protect important times of the year and habitats for wildlife. A NSO or CSU stipulation may be placed on oil and gas leases to protect greater sage-grouse breeding areas or habitat for other special status species from surface-disturbing activities. TLSs or COAs may be used to protect wintering or birthing big game, nesting greater sage-grouse, raptor, mountain plovers, or spawning trout. Application of TLSs to maintenance and operation of a developed project varies by alternative. Protective wildlife seasonal restrictions are developed consistent with statewide dates and in coordination with the Wyoming Game and Fish Department (WGFD) and/or the USFWS.

The BLM may grant exceptions to seasonal restrictions if the BLM determines that granting an exception would not jeopardize the wildlife population being protected. The BLM uses a set of factors when considering a request for an exception. The professional judgment of the BLM and the wildlife agencies play a key part in the BLM's decisions on whether to grant exceptions. No clear-cut formula exists.

The following section describes some of the factors considered by the BLM when determining whether a request for an exception to wildlife seasonal stipulations or COAs should be granted.

1. Resource Concern
   - Animal presence or absence
   - Additional or new resource concerns
   - Potential for increased wildlife accidents or poaching

2. Animal Conditions
   - Physical condition of individual animals (e.g., fat reserves)
   - Local animal population condition (animal density)
   - Potential for additive mortality
   - Likelihood of introduction or increased incidence of disease
   - Likelihood of decreased recruitment/natality

3. Climate/Weather
   - Snow conditions (depth, crusting, and longevity)
   - Current and historic local precipitation patterns
   - Current and historical seasonal weather patterns
   - Recent and current wind-chill factors (indication of animals' energy use)

- Duration of condition
- Short- and long-range forecasts

4. Habitat Condition and Availability
   - Water and forage condition (availability, quality, and quantity)
   - Competition (interspecific, intraspecific)
   - Animal use of available forage
   - Suitable and ample forage immediately available and accessible

5. Spatial Considerations
   - Migration/travel corridors
   - Winter range, foraging, parturition or breeding
   - Topography (plains vs. mountains)
   - Topographic/geographic limitations (barriers)
   - Presence of thermal cover (e.g., protection from wind)
   - Proportion of range impacted
   - Juxtaposition and density of other activities/disturbances in the vicinity
   - Cumulative impacts

6. Timing
   - When proposed activity would occur in the stipulation period
   - Kind and duration of potentially disruptive activity
   - Likelihood of animals habituating to the proposed activity

## E.4.2. Cultural Resources

The areas around and including special Sacred, Spiritual and/or Traditional Cultural Properties such as Castle Gardens (called "restriction zones") are managed with surface occupancy and disturbance stipulations which vary by alternative. The BLM may grant exceptions to these stipulations subject to Standard Protocol and National Historic Preservation Act (NHPA) measures. The BLM would consult with affected tribes to ascertain their opinion on the proposal. The BLM would follow the tribes' opinion regarding restriction zone activities in all but the most extraordinary circumstances.

## E.4.3. Oil and Gas Actions

Title 43 Code of Federal Regulations (CFR) 3101.1-4 establishes procedures for granting modifications or waivers to oil and gas lease stipulations, as stated below:

> A stipulation included in an oil and gas lease shall be subject to modification or waiver only if the Authorized Officer determines that the factors leading to its inclusion in the lease have changed sufficiently to make the protection provided by the stipulation no longer justified or if proposed operations would not cause unacceptable impacts. If the Authorized Officer has determined, prior to lease issuance, that a stipulation involves an issue of major concern to the public, modification or waiver of the stipulation shall be subject to public review for at least a 30-day period. In such cases, the stipulation shall indicate that public review is required before modification or waiver. If subsequent to lease issuance the Authorized Officer determines that a modification or waiver of a lease term

or stipulation is substantial, the modification or waiver shall be subject to public review for at least a 30-day period.

The modification or waiver of an oil and gas lease stipulation implies that the sensitive resource for which the protective measure was considered is in some way not present in the area or in some way no longer in need of the protective measure. In either case, consideration of a modification or waiver of a lease stipulation would require environmental analysis and may result in an amendment to the land use plan.

# E.5. Procedures for Exceptions

Requests for exceptions may, in general, be made at any time. In the case of seasonal restrictions for the benefit of wildlife, the request should be made within 2 weeks of conducting the proposed work. The unpredictability of weather, animal movement and condition, precludes analysis of requests related to wildlife concerns far in advance of the time periods in question. The request is considered as a unique action and is analyzed and documented individually for RMP and NEPA compliance. The request must include the following information:

**WHY** the public land user needs the exception. Include the reason(s) why the action could not be completed within the original stipulation period, any evidence of why the action would not adversely affect the resource or species being protected, or any other information (additional mitigation measures or alternatives) that would help the BLM (and WGFD or USFWS) in reviewing the request.

**WHO** is filing the exception request. This must include the company name, the name of the contact person, and the address, telephone number, e-mail address (if available), and fax number of the contact person.

**WHAT** is being requested. This must include a detailed description of the activity including types of equipment or vehicles required and the number of trips expected. Please include the name and/or number of the authorization (i.e., application for permit to drill, sundry, ROW) and the affected stipulation/restriction.

**WHERE** the activity would take place. This must include the legal description of the activity, the location of the access roads and pipelines, and a map clearly depicting these areas. Proponent prepared Geographic Information System layers meeting BLM requirements will expedite the processing.

**WHEN** the activity would occur. This must include the start date, end date, and time of day/night when activities would occur.

Requests must be made in writing and hard copy delivered to the Lander Field Manager at the physical address of the office. When time is of the essence, the process may be initiated by fax or electronic delivery of a scanned copy but the original must be received by the Lander Field Office within 3 working days. No exception, waiver, or modification will be issued until the hard copy request is received.

BLM may consider verbal requests for and grant verbal approvals of exceptions in DDAs. However, the operator must submit a written notice within 7 days after the verbal request. A verbal request is considered a unique action and should be used only if serious economic or public health and safety problems could result from denial of the request.

Exceptions will not be granted for stipulations or COAs resulting from Section 7 consultation regarding the Endangered Species Act (ESA) with the USFWS for listed species unless a biological assessment (BA) is completed and reinitiation of Section 7 consultation occurs. This process, depending on the potential impacts and whether incidental take is involved, typically requires 3 to 6 months for completion. The operator or lease holder is responsible for the BA, which must be satisfactorily completed in accordance with the requirements of the BLM.

# E.6. Rights-of-Way

**Vegetation Criteria Considered for Projects Proposed in Right-of-Way Avoidance Areas**

Projects proposed for construction in avoidance areas will be considered on a case-by-case basis and must incorporate site-specific mitigation measures aimed at addressing resource concerns on the site. Exceptions may be granted in avoidance areas if the following criteria are met (this list is not all-inclusive):

- ROW proposals that are co-located with existing disturbances where little to no vegetation disturbance is anticipated.
- Slopes of less than 8 percent or, pitch grades above 8 percent of less than 300 feet. Projects that will be constructed on slopes (including pitch grades) in excess of 8 percent must be accompanied by specific stabilization measures for these grades incorporated into the project reclamation plan prior to approval. The use of cover crops is acceptable for stabilization provided that the species utilized meets the Wyoming Reclamation Policy and will ultimately result in compliance with the Reclamation Objectives and Standards identified in Appendix D (p. 1477) of the RMP.
- Soil depths of less than 20 inches to the restrictive layer may be considered on a case-by-case basis contingent on the slope, soil chemistry, and erosion potential being adequate to support successful reclamation on the site.
- Soils with low to moderate wind and water erosion potential may be considered. Projects proposed on soils with high wind and water erosion potential may only be considered where topography and cover are adequate to support successful reclamation on the site.
- Prior to ROW approval, the proposed site must be inventoried for the presence of threatened, endangered, and special status plant species. Where populations of threatened, endangered, and special status plant species will be adversely impacted, the ROW proposal shall be denied.
- Prior to ROW approval, the proposed site must be inventoried for the presence of invasive, noxious, and nonnative species.
- All invasive plant species must be treated (chemical, biological, mechanical) prior to disturbance of site.
- Invasive and nonnative species identified in concentration of less than 5 percent of the total vegetation within the disturbance footprint or less than 15 percent within a 500 square foot area may be considered. Projects proposed in populations exceeding these limitations shall be denied.
- Invasive species management plans must be incorporated into the reclamation plan, and all invasive and nonnative species must be treated (chemical, biological, mechanical) prior to disturbance of the site.
- Construction that will occur in areas dominated by invasive nonnative species (INNS) shall have vehicle wash stations established at the site (two wash stations for linear features at the beginning of the infestation and at the end). All vehicles entering and exiting the site must be washed prior to continuing construction

- ROW proposals within 500 feet of riparian-wetland areas shall be denied unless they are determined to be unavoidable and impacts can be sufficiently mitigated.

**Wild Horse Criteria**

- As new project developments are considered, a careful evaluation must take place to determine if wild horse displacement will increase, and if the displacement will be short or long term. Long-term displacement could lead to changes in use patterns, herd dynamics, and unforeseeable environmental influences to the herd.
- Proposed range improvements and other surface-disturbing and disruptive activities will be subject to reclamation standards and mitigation requirements established under Appendix D (p. 1477) and Appendix M (p. 1595) of the Lander RMP.
- If new fencing projects are being proposed in Herd Management Areas (HMAs) and ROW avoidance areas, careful evaluation must take place to determine the direct, indirect, and cumulative impacts to wild horse herds in HMAs. New fencing must show a neutral or beneficial impact for wild horses. Mitigation, such as the construction of "let-down" fences instead of permanent fencing, often reduces the risk of wild horses not being able to migrate from one part of the HMA to another.
- Proposals for the construction of new water developments in HMAs must analyze all impacts to horses. While the construction of new water developments can be beneficial, careful evaluation must be made to ensure they do not create unintended consequences, such as leading horses outside the boundaries of their HMA or impacting wildlife crucial winter range.
- All vegetation manipulation and land treatment proposals in ROW avoidance areas, including prescribed burns, will be analyzed to ensure proper rest and reclamation success are achieved after project implementation. Ensure that all protective fencing or other infrastructure installed to protect treatment area(s) is compatible with wild horse use and movement.
- Ensure that any new developments in ROW avoidance areas preserve and maintain a healthy and viable wild horse population that will survive and be successful in the HMA during poor years when elements of the habitat are limiting due to severe winter conditions, drought, or other uncontrollable and unforeseeable environmental influences to the herd.

**Wildlife Criteria Considered**

The BLM will use the following questions and/or criteria for wildlife and fish resources, including species listed as endangered, threatened, proposed, or candidate under the ESA, or listed on the Wyoming BLM Sensitive Species List, when addressing proposals for projects in ROW avoidance areas. Proposals will be considered on a case-by-case basis. In project-level environmental impact statements and environment assessments, require, on a case-by-case basis, the development of a wildlife resource monitoring and mitigation plan to address potential impacts from ROW authorizations on wildlife populations and/or habitat.

- Is there existing disturbance in the project area? If yes, what kinds of disturbance and what is the affected acreage? What is the expected number of acres of disturbance that would be added to the existing disturbance total?
- Is there habitat for ESA or BLM Sensitive Species listed in the project area? If threatened and endangered species are present, the project will not be authorized. If BLM Sensitive Species are present, how many acres of this habitat are present in the surrounding area and how many acres would be impacted by the project?
- Does the area contain habitats critical in supporting and/or maintaining regionally important wildlife populations (big game crucial winter range, breeding/birthing/parturition habitat,

and greater sage-grouse winter concentration areas)? If yes, what type of habitat would the project be in and for what species?

- Can the project be conducted and/or constructed entirely outside critical periods for wildlife (breeding, nesting, parturition, and winter)?
- Can the project be co-located entirely within existing disturbance? If no, how many acres of new disturbance would occur and how many acres of existing disturbance are in the project area?
- For projects that are not co-located, will the project result in short-term or long-term loss of habitat?
- Will the project lead to degradation of adjacent habitat from migration of surface disturbance, access to new area, weeds, etc.?
- Will the project cause wildlife to avoid the area? Will the project result in a short-term or long-term disruption to wildlife? What is the project life?
- Will the project lead to continued disruption to wildlife from site visitation and/or maintenance activities?
- Will the location of the project result in functional loss of habitat due to fragmentation?
- Will authorizing the project lead to additional requests for projects in the same area?
- Are there hazards to wildlife associated with proposed project infrastructure?
- Does the project proponent identify adequate reclamation methods and timeframes?
- Does negating and/or minimizing impacts to wildlife cause impacts to other resources identified as needing the area designated as an "avoidance area"?

**Bison Basin Designated Corridor Criteria**

- Beaver Rim Area of Critical Environmental Concern (ACEC) is excluded.
- Plant: Critical Yermo habitat is excluded,
- Wildlife: Aggressive and accelerated reclamation plans for disturbances, including utilizing native plant tubelings to simulate predisturbance conditions.
- Visual Resource Management (VRM): Meet all VRM class objectives.
- VRM: Within view of the Continental Divide National Scenic Trail and the Sixth Crossing Visitors' Center, keep all new surface disturbances within the existing county road disturbance, keep all aboveground pipeline facilities out of view, and minimize use of pipeline markers and adjust placement to protect resource values.
- Cultural Resources: Within view of the National Historic Trails, keep all surface disturbance within existing county road disturbance, minimize the use of pipeline markers, and keep all aboveground pipeline facilities out of view.

# Appendix F. Lander Air Resources Management Plan

## F.1. Purpose

The purpose of this air resources management plan is to address air quality issues identified by the Bureau of Land Management (BLM) in its analysis of potential impacts to air quality resources for the Lander Field Office Resource Management Plan (RMP). This plan outlines the specific requirements for managing air resources and authorizing activities that have the potential to adversely impact air resources within the Lander Field Office planning area. The plan also outlines specific requirements for proponents of projects that have the potential to generate air emissions and adversely impact air resources within the planning area.

## F.2. Air Quality Issues

The BLM based its identification of air quality issues on the following information:

- The air emissions inventory compiled for the planning area which estimated potential emissions of air pollutants for maximum allowable development and authorizations under each alternative
- Existing air monitoring data from the South Pass Special Purpose Monitor (SPM) site, Lander State and Local Air Monitoring Station (SLAMS), the South Pass City and Sinks Canyon National Atmospheric Deposition Program (NADP) sites, and the Bridger and North Absaroka Interagency Monitoring of Protected Visual Environments (IMPROVE) sites.
- The Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas (BLM 2009c), Mineral Occurrence and Development Potential Report (BLM 2009b), and potential levels and location of development identified in Chapter 4 of the RMP.

### F.2.1. Magnitude of Emissions

An air emissions inventory was compiled for the planning area to determine the relative magnitude of total air pollutant emissions and to compare emissions between alternatives. Emissions were calculated using conservative assumptions about the likelihood of potential activities occurring under each alternative that result in maximum air emissions being estimated. For example, air emissions from oil and gas activities assume that all of the potential development identified in the RFD will occur. The RFD is based upon known geologic conditions, current development technology, and industry-provided data about future planned development. Future pricing and economic or technical viability of geologic plays were not taken into account. Air emissions from non-oil and gas mineral development, such as uranium mining, were calculated assuming maximum development scenarios even though these activities are vulnerable to economic variability. Assumptions regarding the use of air emission control technologies were also very conservative. For example, air emissions from drilling activities assume a mixture of Tier 1 – Tier 3 diesel engines. However, it is likely that significant improvement in emissions could be realized over the life of the plan through the use of alternative drilling technologies.

As a result, the compiled air emissions inventory represents the emissions of air pollutants based on best available but very speculative information for future development projections. It is very likely that the emissions inventory over-estimates projected future emissions due to the

conservative assumptions used. However, it is valid for contrasting the impact of management actions and strategies on air resources among alternatives. It is also useful for identifying those activities that are likely to be major contributors to increased air emissions and developing management actions to minimize their impact to air resources.

Despite the limitations of the air emissions inventory it supports two major conclusions:

1. there is not a substantial difference in total air emissions among alternatives (Table 4.1, "Estimated Annual Emissions Summary for BLM Activities in the Lander Planning Area" (p. 594)), and
2. for the management activities analyzed, oil and gas development activities are the major contributor to total air emissions and non-oil and gas mineral development activities (mining) are the major contributor to particulate matter emissions.

The reason there is not a substantial difference in total air emissions among alternatives is the result of several factors:

- The oil and gas development in the planning area is primarily in tightly-focused discrete areas that have relatively few conflicts with other resource uses. The constraints placed on oil and gas development under all alternatives to protect other resources do not vary greatly, therefore, the projected emissions do not vary greatly.
- Under Alternative B, the most restrictive alternative, a substantial portion of the oil and gas RFD is assumed to be developed.
- Under all alternatives, existing sources of emissions are assumed to continue to comprise a substantial portion of total projected emissions.

While the BLM has discretion to make allocative decisions in these areas under any alternative, due to the high percentage of existing leases in areas with potential oil and gas development (approximately 93 percent) the ability to implement substantial restrictions on development is primarily limited to mitigation measures that can be applied during project approval. Such restrictions include cooperative development of project-specific measures to minimize impacts to air resources as outlined in this plan.

## F.2.2. Pollutants of Concern

Air monitoring data from the South Pass SPM site located on the south western edge of the planning area measured ozone ($O_3$) concentrations above the National Ambient Air Quality Standards (NAAQS) during the 2008-2010 time period. Seven exceedances of the 8-hour $O_3$ standard above 75 parts per billion (ppb) were recorded in 2009 while one hour values at or above 75 ppb were recorded twice in 2008 and once in 2010. The South Pass monitor was the only monitor measuring $O_3$ within the planning area during the 2008-2010 period. It is difficult to determine if $O_3$ concentrations above the NAAQS are occurring throughout the planning area or if the high concentrations are unique to the South Pass area because of its proximity to and downwind location from the Upper Green River Valley (a proposed $O_3$ non-attainment area). The Wyoming Department of Environmental Quality (DEQ) Air Quality Division has determined that three stratospheric intrusions caused three periods in February through March 2009 where $O_3$ exceedances occurred at the South Pass, Wyoming, monitor. The emissions inventory compiled for each alternative shows that estimated emissions from BLM authorized activities such as oil and gas development have the potential to cause or contribute to increased levels of $O_3$ which may result in exceedances of the $O_3$ standard due to increased emissions of $O_3$ forming precursors. Therefore, the BLM has identified $O_3$ and the precursors, nitrogen oxides ($NO_x$) and

volatile organic compounds (VOCs), as pollutants of concern to be addressed through specific management actions described in this plan.

Air monitoring data from the residential SLAMs monitor located in the town of Lander shows that the 98th percentile of 24-hour average concentrations for particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) averaged over the three year period 2008-2010 is approximately 30 micrograms per cubic meter (ug/m$^3$) or 87 percent of the NAAQS. However, the annual average of $PM_{2.5}$ concentrations at the same site over the same time period is approximately 8.4 ug/m$^3$ or 56 percent of the NAAQS. It is likely that the short term high concentrations in $PM_{2.5}$ are due to wintertime woodstove use and natural events such as wildfires or high wind events having a localized impact in the town of Lander. It is difficult to fully support this conclusion due to a lack of $PM_{2.5}$ monitoring data in the planning area. The emissions inventory compiled for each alternative shows that estimated emissions from BLM authorized activities such as mining and vegetation management through prescribed fire may have the potential to cause or contribute to short term localized increases in levels of $PM_{2.5}$. Therefore, BLM has identified $PM_{2.5}$ as a pollutant of concern to be addressed through specific management actions described in this plan.

Representative air monitoring data for hazardous air pollutants (HAPs) is not available for the planning area, however increases in estimated emissions of a subset of these pollutants was shown through the compilation of the emissions inventory for each alternative. Specifically, emissions of benzene, toluene, ethyl benzene, xylenes, n-hexane, and formaldehyde were estimated to increase due primarily to development of oil and gas resources. Emissions of these pollutants from leaks, venting, internal combustion, and flaring associated with BLM authorized oil and gas development have the potential to result in short term, near-field increases in concentrations of these pollutants. Therefore, BLM has identified this subset of HAPs as pollutants of concern to be addressed through specific management actions described in this plan.

## F.2.3. Air Emission Generating Activities

Air emissions were estimated for 11 different categories of activities that BLM authorizes, allows, or performs and that have the potential to emit regulated air pollutants. The estimated emissions, based on the maximum development potential under each alternative were used to identify activities that have the potential to contribute to increases in concentrations of regulated air pollutants and to determine those activities that warrant specific management strategies for minimizing air quality impacts.

Under each alternative, oil and gas development activities were identified as the major contributor to increases in emissions of $NO_x$, VOC, and HAPs. Non-oil and gas mineral development activities, specifically sand and gravel mining and processing, and other solid minerals mining were identified as the major contributor to increases in particulate matter emissions.

## F.2.4. Geographic Areas of High Potential for Development

The Mineral Occurrence and Development Potential Report and the RFD Scenario for Oil and Gas identified geographic areas of high, moderate, and low development potential for conventional oil and gas, coalbed natural gas (CBNG), and locatable and salable minerals.

One area was identified within the planning area as high potential for conventional oil and gas development and is located in the northeast corner of the planning area surrounding the

town of Lysite. This area is comprised of the existing and proposed expansion of the Gun Barrel, Madden Deep, Ironhorse oil and gas development units. Areas of moderate potential for oil and gas development have been identified in the central portion of the planning area surrounding the Beavercreek unit and in the southern portion of the planning area overlapping the Fremont-Sweetwater county border (Map 17). Moderate potential for CBNG development has been identified in these same two areas (Map 20).

Under Alternative D (Proposed RMP), the Lander Field Office identified Designated Development Areas (Map 134) based on locations of high and moderate potential oil and gas development and a need to protect other resources. The intention of these Designated Development Areas is to maximize potential oil and gas development in defined locations while minimizing impacts to other natural resources across the planning area. The locations of these Designated Development Areas provide the following benefits to air resources:

- Encourages future oil and gas development in areas of existing development thereby reducing impacts to air from new construction, new production facilities, and new compression sources that would be required in undeveloped fields,
- Encourages future oil and gas development in areas located downwind of and over 50 kilometers (31 miles) from the nearest federally designated Class I area,
- Downwind impacts from the Designated Development Areas are not likely to impact Class I or sensitive Class II areas, major population centers,
- Encourages future oil and gas development in geographic areas of relatively flat terrain with minor shallow basins and relatively consistent west-southwesterly winds thereby minimizing potential for stagnation and cold pooling that can lead to increased $O_3$ formation,
- Encourages future oil and gas development in areas a considerable distance from major population centers,
- Excludes oil and gas development in the Dubois area, an area of air quality sensitivity due to its proximity to federally designated Class I and identified sensitive Class II areas.

Geographic areas of high, moderate, and low potential for locatable minerals (specifically uranium, phosphate, bentonite, and gold) and salable minerals (specifically sand and gravel) were identified within the planning area. The Lander Field office has also identified specific areas that would be closed to mineral materials disposal (Map 37), and locatable mineral withdrawals (Map 24) within each of the alternatives. When these restrictions are considered in concert with the geologic locations of non-oil and gas minerals, likely locations for non-oil and gas minerals development are constrained to areas located primarily in the central and southern portions of the planning area. These potential areas of development are located in geographic areas of relatively flat terrain with minor shallow basins and relatively consistent west-southwesterly winds. Because particulate matter emissions are the primary pollutant of concern associated with non-oil and gas minerals development there is a potential for high winds in these areas to contribute to short term increases in fugitive dust emissions from storage piles, wind erosion, and construction activities. However, the likely locations for development are not located near population centers, but are located downwind from Class I and sensitive Class II areas. Table F.1, "Class I and Class II Areas in the Vicinity of the Planning Area" (p. 1495), displays Class I and II areas in the vicinity of the planning area.

**Table F.1. Class I and Class II Areas in the Vicinity of the Planning Area**

| Area Type | Area Name | Closest Distance to the Lander Planning Area (miles) | Direction from the Lander Planning Area | Clean Air Act Status of the Area |
|---|---|---|---|---|
| National Park | Grand Teton National Park | 20 | West | Class I |
| | Yellowstone National Park | 25 | West | Class I |
| Recreation Area | Bighorn Canyon National Recreation Area | 90 | North | Class II |
| Wilderness Area | Cloud Peak Wilderness Area | 60 | Northeast | Class II |
| | North Absaroka Wilderness Area | 80 | Northwest | Class I |
| | Washakie Wilderness Area | 40 | Northwest | Class I |
| | Fitzpatrick Wilderness Area | In | N/A | Class I |
| | Popo Agie Wilderness Area | In | N/A | Class II |
| | Bridger Wilderness Area | Adjacent | West | Class I |
| | Teton Wilderness Area | 30 | Northwest | Class II |
| National Forest | Bighorn National Forest | 60 | Northeast | Class II |
| | Thunder Basin National Grassland | 90 | East | Class II |

Source: NPS 2006

N/A Not Applicable

# F.2.5. Summary of Air Quality Issues

- Recent measurements at an air monitoring station in the planning area show that measured ambient concentrations of $O_3$ have, on several occasions, exceeded the current $O_3$ NAAQS of 75 ppb.
- The emissions inventory showed potentially significant increases in estimated emissions of $O_3$ forming pollutants ($NO_x$ and VOCs) which could result in increased concentrations of $O_3$ if oil and gas resources are authorized and developed to the full potential evaluated under each alternative. In addition, potential increases in HAP and $PM_{2.5}$ emissions and corresponding short term increases in ambient concentrations could result if all activities are authorized and developed to the full potential evaluated under each alternative.
- The air analysis for the RMP showed that oil and gas development activities have the potential to be the major contributor to estimated $NO_x$, VOC, and HAP emissions. Non-oil and gas mineral development activities (i.e., sand and gravel extraction, bentonite, uranium, and gold mining) have the potential to be the major contributor to estimated $PM_{2.5}$ emissions.
- The geographic areas identified as having high potential for oil and gas or non-oil and gas minerals development are located in areas that are unlikely to impact Class I or sensitive Class II areas or major population centers.

# F.3. Field Office Air Resource Management Requirements

The Lander Field Office has the responsibility to implement the decisions of the RMP in a manner that protects air quality while recognizing valid and existing leasing rights. Within the planning area, most areas with high and moderate oil and gas development potential are already leased. While the BLM has limited ability to alter the conditions of existing leases, it can require specific actions and measures necessary to protect air quality in response to identified or anticipated adverse impacts at the project level stage.

Development and implementation of appropriate protection measures is most effective at the project approval stage, because the proposed action has been defined and impacts to air quality are better able to be identified through National Environmental Policy Act analysis. As part of the project approval process the BLM will identify project-specific measures in response to identified impacts to air resources, as outlined in this air resources management plan.

## F.3.1. Authorization of Air Emission Generating Activities

F.3.1.1 BLM has the authority and responsibility under Federal Land Policy and Management Act to manage public lands in a manner that will protect the quality of air and atmospheric values. Therefore, BLM may manage the pace, place, density, and intensity of leasing and development to meet air quality goals.

F.3.1.2 BLM will, prior to authorization of any activity that has the potential to emit any regulated air pollutant, consider the magnitude of potential air emissions from the project or activity, existing air quality conditions, geographic location, and issues identified during project scoping to identify pollutants of concern and to determine the appropriate level of air analysis to be conducted for the project. This analysis may include; obtaining additional air monitoring data, air dispersion modeling, photochemical grid modeling, and/or mitigation measures in addition to any applicable regulatory emission limits and standards.

F.3.1.3 BLM will require project proponents to comply with the requirements under Section F.4 of this plan. BLM will review any project specific emissions inventory submitted as required under Section F.4.1 to determine its completeness and accuracy.

F.3.1.4 In areas where Wyoming DEQ approved (or equivalent) air monitoring data shows that ambient air concentrations of a regulated pollutant are at or above 85 percent of the applicable NAAQS or Wyoming Ambient Air Quality Standard (WAAQS), BLM will require the proponent for any project that has the potential to emit the pollutant or precursors to the pollutant to comply with (a) or (b) below:

a. Demonstrate that the project will result in no net increase in annual emissions of the pollutant for the life of the project (e.g., through the application of emission control technologies, offsets, or other air emission reducing strategies); or,
b. Demonstrate that the project will not cause or contribute to a violation of the ambient air quality standard through a quantitative air quality analysis (e.g., air dispersion modeling, photochemical grid modeling or an equivalent level of analysis.

F.3.1.5 Ambient air monitoring data in the planning area shows that existing concentrations of $O_3$ are at a level of concern to the BLM and the emissions inventory for the Lander RMP shows that oil and gas development activities have the potential to be a major contributor to $O_3$ forming

pollutant emissions. Therefore, the requirements of F.3.1.4 apply and project proponents for oil and gas development activities within the planning area must comply with (a) or (b) below:

a. Demonstrate that the project will result in no net increase in annual emissions of $NO_x$ and VOCs for the life of the project (e.g., through the application of emission control technologies, offsets, or other air emission reducing strategies); or,
b. Demonstrate that the project will not cause or contribute to a violation of the ambient air quality standard for $O_3$ through a quantitative air quality analysis (to include photochemical grid modeling or an equivalent level of analysis).

F.3.1.6 Ambient monitoring data within the planning area shows that existing concentrations of $PM_{2.5}$ are at a level of concern to the BLM and the emissions inventory for the Lander RMP shows that non-mineral development and prescribed fire activities have the potential to contribute to increases in $PM_{2.5}$ ambient concentrations. Therefore, prior to BLM approval of a project that is likely to contribute to short term increases in $PM_{2.5}$ ambient concentrations, BLM will require any non-oil and gas mineral development project proponent to:

a. demonstrate that it has applied for and obtained any required air permit from Wyoming DEQ,
b. demonstrate that the project will not cause or contribute to a violation of the applicable ambient air quality standard and,
c. provide a plan for controlling and minimizing fugitive dust emissions.

Prescribed fire projects will be required to minimize impacts to air quality, and will comply with local and state smoke management plans and regulations.

## F.3.2. Monitoring

As part of a comprehensive air management plan for the planning area, BLM commits to the following measures with regards to ambient air monitoring:

- BLM will work cooperatively with Wyoming DEQ to determine the best mechanism to submit, track, and approve project specific pre-construction monitoring or monitoring data required in a project specific record of decision (ROD),
- BLM will work cooperatively with Wyoming DEQ to share data collected from the existing BLM-operated Wyoming Air Resource Monitoring System (WARMS) network and to support Wyoming DEQ's air monitoring network through siting, operation, and funding of additional monitoring sites,
- BLM will continue to fund and operate the NADP monitoring site at Sinks Canyon.
- BLM may require project proponents to conduct pre-construction and/or project air monitoring as described in Section F.4.2.

## F.3.3. Modeling

BLM recognizes that air dispersion and photochemical grid models are useful tools for predicting project specific impacts to air quality, predicting the potential effectiveness of control measures and strategies, and for predicting trends in regional concentrations of some air pollutants. As part of a comprehensive air management plan for the planning area, BLM commits to the following with regards to air quality modeling:

- BLM will require project specific air quality modeling as outlined in Section F.4.
- BLM will ensure that project specific modeling is carried out in accordance with Environmental Protection Agency modeling guidelines and in cooperation with the air quality interagency review team.

- BLM will support and participate in regional modeling efforts through multi-state and/or multi-agency organizations such as Western Governor's Association – Western Regional Air Partnership, the Federal Leadership Forum, and Wyoming DEQ's Ozone Technical Forum and Resource Directory.
- Require modeling that assesses impacts to air quality and/or air-quality related values if a proposed action meets at least one of the following conditions in each category:
- ○ Emissions/Impacts: The proposed action is anticipated to cause a substantial increase in emissions based on the emissions inventory, or will materially contribute to potential adverse cumulative air quality impacts as determined under the National Environmental Policy Act.
  - ○ Geographic Location: The proposed action is in
    - ■ Proximity to a Class I or sensitive Class II Area; or
    - ■ A Non-Attainment or Maintenance Area; or
    - ■ An area expected to exceed the NAAQS or Prevention of Significant Deterioration increment based on
      - ■ Monitored or previously modeled values for the area;
      - ■ Proximity to designated Non-Attainment or Maintenance Areas; or
      - ■ Emissions for the proposed action based on the Emissions Inventory

## F.3.4. Mitigation

BLM recognizes that many of the activities that it authorizes, permits, or allows generate air pollutant emissions that have the potential to adversely impact air quality. The primary mechanism to reduce air quality impacts is to reduce emissions (mitigation). As part of this comprehensive air management plan for the planning area, BLM commits to the following with regards to reducing emissions:

- BLM will require project proponents to include measures for reducing air pollutant emissions in project proposals and Plans of Development as described in Section F.4,
- BLM will require additional air emission control measures and strategies within its regulatory authority and in consultation with Wyoming DEQ and other federal agencies when appropriate if an operator's proposed or committed measures are insufficient to achieve air quality goals,
- BLM will ensure that air pollution control measures and strategies (both operator committed and required mitigation) are enforceable by including specific conditions in a ROD.

# F.4. Project Specific Requirements

BLM has identified activities and pollutants of concern for the planning area and this section contains specific requirements for project proponents. Mineral development activities, specifically oil and gas development and mining, have been identified as having the potential to contribute to increases in ambient concentrations of $O_3$, HAPs and $PM_{2.5}$. Proponents of mineral development projects must comply with Section F.4.1 and Section F.4.4.1 at a minimum. In addition, project proponents for other activities may be required to comply with Section F.4 as determined by BLM taking into account existing air quality conditions and availability of representative air monitoring data, magnitude of estimated project emissions, meteorologic and geographic conditions in the vicinity of the project, and the current state of air pollution control technology.

## F.4.1. Emissions Inventory

The proponent of a mineral development project will provide the BLM an emissions inventory that quantifies emissions of regulated air pollutants from all sources related to the proposed project, including fugitive emissions and greenhouse gas emissions, estimated for each year for the life of the project. BLM will use this estimated emissions inventory to identify pollutants of concern and to determine the appropriate level of air analysis to be conducted for the proposed project.

The BLM may require an emissions inventory for other actions depending on the magnitude of potential air emissions from the project or activity, proximity to a federally mandated Class I area, sensitive Class II area, or population center, location within a non-attainment or maintenance area, meteorologic or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during project scoping.

## F.4.2. Monitoring

F.4.2.1 The proponent of a mineral development project that has the potential to emit more than 100 tons per year of any criteria air pollutant must provide a minimum of one year of baseline ambient air monitoring data for any pollutant(s) of concern as determined by BLM, if no representative air monitoring data are being collected within 50 kilometer of the project area, or existing ambient air monitoring data are insufficient, incomplete, or does not meet minimum air monitoring standards set by Wyoming DEQ. If BLM determines that baseline monitoring is required, this pre-analysis data must meet DEQ air monitoring standards, be obtained from a site within 50 kilometer of project boundary, and cover the year immediately prior to the submittal. This requirement may be waived where the life of the project is less than one year.

F.4.2.2 The BLM may require monitoring for the life of the mineral development project depending on the magnitude of potential air emissions from the project or activity, proximity to a federally mandated Class I area, sensitive Class II area, or population center, location within a non-attainment or maintenance area, meteorologic or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during project scoping.

F.4.2.3 The BLM may require project proponents of other air emission generating projects to conduct baseline or life of project air monitoring depending on the magnitude of potential air emissions from the project or activity, proximity to a federally mandated Class I area, sensitive Class II area, or population center, location within a non-attainment or maintenance area, meteorologic or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during project scoping.

## F.4.3. Modeling

F.4.3.1 The proponent of a mineral development project that has the potential to emit more than 100 tons per year of any criteria pollutant will be required to conduct air quality modeling for any pollutant(s) of concern, as determined by BLM, unless the project proponent can demonstrate that the project will result in no net increase in emissions of the pollutant(s) of concern. BLM, in cooperation with the interagency review team, will determine the parameters for the modeling analysis through the development of a project specific modeling protocol.

F.4.3.2 BLM may require air quality modeling for other air emission generating projects or for projects, actions, or management activities with estimated emissions below the threshold listed in F.4.3.1 if other criteria that warrant an air dispersion or photochemical modeling analysis are identified for purposes of analyzing project direct, indirect or cumulative impacts to air quality. Such criteria may include the magnitude of potential air emissions from the project or activity, proximity to a federally mandated Class I area, sensitive Class II area, or population center, location within a non-attainment or maintenance area, meteorologic or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during project scoping.

## F.4.4. Mitigation

F.4.4.1 The proponent of a mineral development project will be required to minimize air pollutant emissions by complying with all applicable state and federal regulations (including application of Best Available Control Technology) and may be required to apply additional mitigation including but not limited to best management practices and other control technologies or strategies identified by the BLM or Wyoming DEQ in accordance with delegated regulatory authority.

F.4.4.2 The proponent of a mineral development project that has the potential to emit any regulated air pollutant will be required to provide a detailed description of operator committed measures to reduce project related air pollutant emissions including greenhouse gases and fugitive dust. Project proponents for oil and gas development projects should refer to Table U.5, "Emission Reduction Strategies for Oil and Gas Development" (p. 1662) included in Appendix U (p. 1651) of the RMP (and in Table F.2, "Emission Reduction Strategies for Oil and Gas Development" (p. 1501), below) as a reference for potential control technologies and strategies. The list is not intended to preclude the use of other effective air pollution control technologies that may be proposed.

F.4.4.3 BLM may require the proponent of other air emission generating projects to comply with F.4.4.1 and F.4.4.2 based on the magnitude of potential air emissions from the project or activity, proximity to a federally mandated Class I area, sensitive Class II area, or population center, location within a non-attainment or maintenance area, meteorologic or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during project scoping.

F.4.4.4 BLM may require project proponents to submit a contingency plan that provides for reduced operations in the event of an air quality episode. Specific operations and pollutants to be addressed in the contingency plan will be determined by BLM on a case-by-case basis taking into account existing air quality and pollutants emitted by the project.

## Table F.2. Emission Reduction Strategies for Oil and Gas Development

| Mitigation Measure | Environmental Benefits | Environmental Liabilities | Feasibility |
|---|---|---|---|
| **Control Strategies for Drilling and Compression** | | | |
| Directional Drilling | Reduces construction related emissions (dust and vehicle and construction equipment emissions). Decreases surface disturbance and vegetation impacts (dust and $CO_2$ and nitrogen flux). Reduces habitat fragmentation | Could result in higher air impacts in one area with longer sustained drilling times. | Depends on geological strata |
| Improved engine technology (Tier 2 or better) for diesel drill rig engines | Reduced $NO_x$, PM, CO, and VOC emissions | – | Dependent on availability of technology from engine manufacturers |
| Selective Catalytic Reduction (SCR) for drill rig engines and/or compressors | $NO_x$ emissions reduction and decreased formation of visibility impairing compounds. $NO_x$ control efficiency of 95 percent achieved on drill rig engines. $NO_x$ emission rate of 0.1 grams per horsepower hour achieved for compressors | Potential $NH_3$ emissions and formation of visibility impairing ammonium sulfate. Regeneration/disposal of catalyst can produce hazardous waste. | Not applicable to 2-stroke engines |
| Non-selective catalytic reduction (NSCR) for drill rig engines and/or compressors | $NO_x$ emissions reduction and decreased formation of visibility impairing compounds. $NO_x$ control efficiency of 80-90 percent achieved for drill rig engines. $NO_x$ emission rate of 0.7 grams per horsepower hour achieved for compressor engines greater than 100 horsepower. | Regeneration/disposal of catalysts can produce hazardous waste. | Not applicable to lean burn or 2-stroke engines |
| Natural Gas fired drill rig engines | $NO_x$ emissions reduction and decreased formation of visibility impairing compounds | – | Requires onsite processing of field gas. |
| Electrification of drill rig engines and/or compressors | Decreased emissions at the source. Transfers emissions to more efficiently controlled source (EGU) | Displaces emissions to EGU. | Depends on availability of power and transmission lines |
| Improved engine technology (Tier 2 or better) for all mobile and non-road diesel engines. | Reduced $NO_x$, PM, CO, and VOC emissions | – | Dependent on availability of technology from engine manufacturers |

| Mitigation Measure | Environmental Benefits | Environmental Liabilities | Feasibility |
|---|---|---|---|
| Green (also known as closed loop or flareless) completions | Reduction in VOC and $CH_4$ emissions. Reduces or eliminate flaring and venting and associated emissions. Reduces or eliminates open pits and associated evaporative emissions. Increased recovery of gas to pipeline rather than atmosphere. | Temporary increase in truck traffic and associated emissions. | Need adequate pressure and flow. Need onsite infrastructure (tanks/dehydrator). Availability of sales line. Green completion permits required by Wyoming BACT in some areas |
| Green workovers | Same as above. | Same as above. | Same as above. |
| Minimize or eliminate venting and/or use closed loop process where possible during "blow downs" | Same as above. | – | Best Management Practices required by Wyoming BACT |
| Reclaim/remediate existing open pits, no new open pits | Reduces VOC and GHG emissions. Reduces potential for soil and water contamination. Reduces odors. | May increase truck traffic and associated emissions. | Requires tank and/or pipeline infrastructure. |
| Electrification of wellhead compression/pumping | Reduces local emissions of fossil fuel combustion and transfers to more easily controlled source. | Displaces emissions to EGU | Depends on availability of power and transmission lines |
| Wind (or other renewable) generated power for compressors | Low or no emissions. | May require construction of infrastructure. Visual impacts. Potential wildlife impacts. | Depends on availability of power and transmission lines |
| **Control Strategies Utilizing Centralized Systems** | | | |
| Centralization (or consolidation) of gas processing facilities (separation, dehydration, sweetening, etc.) | Reduces vehicle miles traveled (truck traffic) and associated emissions. Reduced VOC and GHG emissions from individual dehy/separator units. | Temporary increase in construction associated emissions. Higher potential for pipe leaks/groundwater impacts. | Requires pipeline infrastructure. |
| Liquids Gathering systems (for condensate and produced water) | Reduces vehicle miles traveled and associated emissions. Reduced VOC and GHG emissions from tanks, truck loading/unloading, and multiple production facilities. | Temporary increase in construction associated emissions. Higher potential for pipe leaks/groundwater impacts. | Requires pipeline infrastructure. |
| Water and/or fracturing liquids delivery system | Reduced long term truck traffic and associated emissions. | Temporary increase in construction associated emissions. Higher potential for pipe leaks/groundwater impacts. | Requires pipeline infrastructure. Not feasible for some terrain. |
| **Control Strategies for Tanks, Separators, and Dehydrators** | | | |
| Eliminate use of open top tanks | Reduced VOC and GHG emissions. | – | Required by Wyoming BACT for produced water tanks in some areas. |

| Mitigation Measure | Environmental Benefits | Environmental Liabilities | Feasibility |
|---|---|---|---|
| Capture and control of flashing emissions from all storage tanks and separation vessels with vapor recovery and/or thermal combustion units. | Reduces VOC and GHG emissions. | Pressure build up on older tanks can lead to uncontrolled rupture. | 98 percent VOC control if ≥ 10 TPY required statewide by Wyoming BACT |
| Capture and control of produced water tank emissions. | Reduces VOC and GHG emissions. | – | 98 percent VOC control and no open top tanks required by Wyoming DEQ in some areas |
| Capture and control of dehydration equipment emissions with condensers, vapor recovery, and/or thermal combustion. | Reduces VOC, HAP, and GHG emissions. | – | Still vent condensers required and 98 percent VOC control if ≥ 8 TPY required statewide and in CDA by Wyoming BACT. All dehy emissions controlled at 98 percent in JPAD (no 8 TPY threshold) |
| **Control Strategies for Misc. Fugitive VOC Emissions** | | | |
| Install and maintain low VOC emitting seals, valves, hatches on production equipment. | Reduces VOC and GHG emissions. | – | – |
| Initiate an equipment leak detection and repair program (including use of FLIR cameras, grab samples, organic vapor detection devices, visual inspection, etc.) | Reduction in VOC and GHG emissions. | – | – |
| Install or convert gas operated pneumatic devices to electric, solar, or instrument (or compressed) air driven devices/controllers. | Reduces VOC and GHG emissions. | Electric or compressed air driven operations can displace or increase combustion emissions. | – |
| Use "low" or "no bleed" gas operated pneumatic devices/controllers. | Reduces VOC and GHG emissions. | – | or closed loop required statewide by Wyoming BACT |
| Use closed loop system or thermal combustion for gas operated pneumatic pump emissions. | Reduces VOC and GHG emissions. | – | Required statewide by Wyoming BACT (98 percent VOC control or closed loop) |
| Install or convert gas operated pneumatic pumps to electric, solar, or instrument (or compressed) air driven pumps. | Reduces VOC and GHG emissions. | Electric or compressed air driven operations can displace or increase combustion emissions. | Required statewide by Wyoming BACT if no thermal combustion used. |
| Install vapor recovery on truck loading/unloading operations at tanks. | Reduces emissions of VOC and GHG emissions. | Pressure build up on older tanks can lead to uncontrolled rupture. | Wyoming BACT analysis required if VOC ≥ 8 TPY or HAP ≥ 5 TPY. |
| **Control Strategies for Fugitive Dust and Vehicle Emissions** | | | |
| Unpaved surface treatments including watering, chemical suppressants, and gravel. | 20 percent - 80 percent control of fugitive dust (particulates) from vehicle traffic. | Potential impacts to water and vegetation from runoff of suppressants. | – |

| Mitigation Measure | Environmental Benefits | Environmental Liabilities | Feasibility |
|---|---|---|---|
| Use remote telemetry and automation of wellhead equipment. | Reduces vehicle traffic and associated emissions. | – | – |
| Speed limit control and enforcement on unpaved roads. | Reduction of fugitive dust emissions. | – | – |
| Reduce commuter vehicle trips through car pools, commuter vans or buses, innovative work schedules, or work camps. | Reduced combustion emissions, reduced fugitive dust emissions, reduced $O_3$ formation, reduced impacts to visibility. | – | – |
| **Miscellaneous Control Strategies** | | | |
| Use of ultra-low sulfur diesel in engines, compressors, construction equipment, etc. | Reduces emissions of particulates and sulfates. | – | Fuel not readily available in some areas. |
| Reduce unnecessary vehicle idling. | Reduced combustion emissions, reduced $O_3$ formation, reduced impacts to visibility, reduced fuel consumption. | – | – |
| Reduced pace of (phased) development. | Peak emissions of all pollutants reduced. | Emissions generated at a lower rate but for a longer period. LOP, duration of impacts is longer. | May not be economically viable or feasible if multiple mineral interests. |

$CO_2$ Carbon Dioxide
DEQ Department of Environmental Quality
$NO_X$ Nitrogen Oxides
$O_3$ ozone
CO Carbon Monoxide
EGU Electric Generating Unit
VOC Volatile Organic Compound
$CH_4$ Methane
$NH_3$ Ammonia
BACT Best Available Control Technology
GHG Greenhouse Gas
HAP Hazardous Air Pollutant
LOP life of plan
TPY Tons per year
JPAD Joint Precision Airdrop System
FLIR Forward Looking Infrared

# Appendix G. Example Detailed, Multi-phased, Reclamation Plan

## Continental Divide-Creston Natural Gas Project Environmental Impact Statement (EIS) Reclamation Goal Statement

Encourage informed decisions to minimize initial disturbance and return disturbance as quickly and effectively as possible to pre-disturbance conditions. Identify important characteristics of revegetation for evaluation of interim reclamation that serve as criteria for rollover and that are indicative that revegetation is moving toward successful reclamation.

### A. Development of a comprehensive reclamation plan

#### I. Conduct a pre-disturbance inventory of proposed disturbance and reference areas

Pre-disturbance inventories are used for two main purposes. The first is to use site-specific information to develop a reclamation plan, including treatment of soils and identification of appropriate species to include in the seed mix and the site's ability to serve as a source of seed prior to disturbance. The second purpose is to identify any issues, such as saline soils, steep topography, or invasive species that will impact successful interim and/or final reclamation.

#### II. Describe landscape features and climate

1. Climate and physical characteristics of the site are important factors to consider in development of a reclamation plan, particularly in identifying possible problems. For example, a site on a south-facing slope may suggest that more drought tolerant plants should be selected than if the site is on a north-facing slope. Topography (slope and aspect), climate (including postulated microclimate), and parent materials (geological substrates) are considerations in site selection and reclamation plan development.

2. Steep topography: Steep slopes that would result in site instability should be avoided. If the slope is greater than 25 percent, the Bureau of Land Management (BLM) may advise the site be relocated.

3. Poor or erodible parent materials, or a rocky surface or, marine shales, clay/siltstone, or selenium bearing geological substrates at the surface may result in difficult reclamation conditions and should be avoided. If such areas are planned to be disturbed by the Operator, all possible resources will need to be employed by the BLM to ensure successful reclamation.

4. Available climate information, including precipitation patterns and growing season relative to the site planned for disturbance, will be addressed by the Operator in the site-specific reclamation plan in the Application for Permit to Drill (APD) approved by the BLM.

#### III. Suitable soil inventory

a. Soil characteristics may strongly influence reclamation efforts. Fundamental characterization of soils ahead of disturbance can identify potential problems, so they can be addressed during disturbance, soil stockpiling and reclamation, instead of waiting for reclamation failure.

b. The phrase "suitable soil" is used mainly because of confusion over the definition of topsoil. Soil depth, pH, electrical conductivity, texture, surface features (e.g. barren, rocky, crusty, plant litter), and organic matter content are characteristics that may be used to determine if a soil is suitable. Other information may be needed. See: "Successful restoration of severely disturbed lands: Overview of critical components," B-1202, (and available for free at http://ces.uwyo.edu/PUBS/B1202.pdf).

c. Soil characteristics that can signal a high probability of reclamation problems include: pH, electrical conductivity, soil texture, surface/subsurface features, sodium adsorption ratio, calcium carbonate content, soil compaction and saturation percentage and the below listed characteristics will be addressed by the Operator in the site-specific reclamation plan in the APD approved by the BLM.

1. Soils with pH 7.8 and higher progressively become less suitable for reclamation and will be addressed by the Operator in the site-specific reclamation in the APD approved by the BLM.

2. An electrical conductivity of soil greater than eight (8) dS/m and any increase in salt content of the soil above .5 dS/m will progressively negatively affect the establishment and growth of plants. Soils exhibiting these characteristics will be addressed by the Operator in the site-specific reclamation plan in the APD approved by the BLM.

3. Soils with textures representing clay, sand or loamy sand will be addressed by the Operator in the site-specific reclamation plan in the APD approved by the BLM.

4. Surface and subsurface soil in and through the root zone dominated by coarse material greater than 2 mm in diameter and greater than 40 percent in the soil profile to be stockpiled may signify reclamation difficulties and will be considered in the site-specific reclamation plan in the APD by the BLM and Operator.

5. Sodium adsorption ratio is a key diagnostic soil trait that may be determined for soils to be disturbed and placed in the suitable soil stockpile; and will be addressed by the Operator in the site-specific reclamation plan in the APD approved by the BLM.

6. Calcium carbonate content (percent lime) will control the amount of plant available phosphorus and will determined in the site-specific reclamation plan in the APD by the Operator and approved by the BLM.

7. The soil saturation percentage will control the ability for plants to germinate and survive after reclamation actions have been taken by the Operator

and will be addressed by the Operator in the site-specific reclamation plan in the APD approved by the BLM.

## IV. Vegetation inventory

a. Gathering vegetation data before a site has been cleared for drilling documents pre-disturbance site conditions and in turn guides management decisions regarding what species could be expected to successfully revegetate a site to match its existing or potential state. Seed mixes should be based on desired vegetation that has historically grown on-site and that has been shown to be successful in previous trials. Return of cover should be gauged by comparison with actual pre-disturbance site conditions and/or reference areas.

b. Vegetation characteristics that would signal a high probability of reclamation problems:

   1. The presence of Halophytes: e.g., Saltbush

   2. The presence of Alkali Halophytes: e.g., Greasewood, Halogeton

   3. The presence of Noxious and Invasive Species: e.g., Cheatgrass, Russian thistle, Russian knapweed, Alyssum, Canada thistle.

c. The methodologies to be used to determine the information for the vegetation inventory will be addressed by the Operator in the site-specific reclamation plan in the APD approved by the BLM.

   1. BLM guidelines for vegetation sampling: Sampling Vegetation Attributes, Interagency Technical Reference (1996) Revised in 1997 and 1999. BLM/RS/ST-96/002+1730. 171 pages. URL for Sampling Vegetation Attributes: http://www.blm.gov/nstc/library/pdf/samplveg.pdf. All BLM technical references: http://www.blm.gov/nstc/library/techref.htm.

## V. Select a reference area

a. A reference area is a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of an area to be affected by resource extraction. Reclaimed areas are compared to reference areas to determine successful interim and final reclamation.

b. In Wyoming, a site can have multiple ecological communities surrounding it (e.g. dunes, alkali flats, and sagebrush). Ecological variation at a given site can make it difficult to evaluate which adjacent area should serve as a reference. The most accurate way to choose a reference area is to perform pre-disturbance monitoring and identify the dominant community on or adjacent to a site before construction begins. This measure ensures that initial efforts to establish vegetation are consistent with species that naturally occur at that location. A reference area located adjacent to the construction site, with similar soils, vegetation, and aspect of the area to be disturbed will be addressed by the Operator in the site-specific reclamation plan in the APD approved by the BLM.

## B. Invasive plant management plan for construction and reclamation activities

Disturbed sites can provide ideal opportunities for invasive plant species to propagate. Invasive plants can be transferred to the disturbed site from adjoining areas and out-compete desired vegetation during reclamation and/or spread to new areas. The best approach to combat invasive species is to use careful suitable soil handling and an appropriate seed mix. Pre-disturbance planning, including early weed management for invasive species is vital to reduce costs and ensure successful reclamation.

a. Assess for noxious and invasive weed species before initiating surface disturbing activities, during disturbance, during interim and final reclamation, and after reclamation is completed.

b. Web address for the Wyoming Weed and Pest Council: http://www.wyoweed.org/

c. Apply weed control treatments

d. Monitor weedy plant species at least annually to evaluate success of weed control treatments and determine if continued weed control is necessary.

## C. Develop a reclamation plan

Reclamation planning provides a detailed strategy for returning a disturbed site back to a functioning pre-disturbance condition. Reclamation planning also may minimize costs and greatly improves chances of successful interim and final reclamation. The reclamation plan will be made part of the APD by the Operator and BLM.

### I. Site preparation, storm water, surface stability, and soil management for interim reclamation

a. Site preparation activities readies a site for revegetation activities and in general include replacement of stockpiled suitable and unsuitable soils, reestablishing a stable subsurface environment, recontouring (reconstruction of landscape), incorporation of soil amendments and primary tillage/ripping to relieve soil compaction prior to spreading suitable soil and secondary tillage using a parabolic plow just prior to seeding.

b. Soil Management includes the handling and management of stockpiled soil on the site in a way that minimizes loss from erosion and best preserves its ability to support a productive plant community, the soil biota and their habitat as well as its physical and chemical properties.

c. A Construction Stormwater Permit from the Wyoming Department of Environmental Quality (DEQ) is required any time a project results in clearing, grading, or otherwise disturbing one or more acres. The disturbed area does not need to be contiguous. The permit is required for surface disturbances associated with construction of the project, access roads, construction of wetland mitigation sites, borrow and stockpiling areas, equipment staging and maintenance areas and any other disturbed areas associated with construction. A general permit has been established for this purpose and either the Operator or general contractor is

responsible for filing a Notice of Intent (NOI) and complying with the provisions of the general permit.

d. A reclamation plan should include a description of how the Operator will achieve the following for surface stability:

1. Redistribute soil materials in a manner to optimize revegetation potential.

2. Relieve compaction of the redistributed soil (suitable and unsuitable) to an appropriate depth (18-24 inches) just prior to seeding to accommodate desired plant species germination and sustained growth.

3. Prepare the seedbed, optimize roughness, furrow on contour to prevailing wind or pit, description of technology to be used, establish surface conditions that would enhance development of diverse, stable, self-generating plant communities, and description of erosion control to be maintained on the site.

4. reestablish slope stability and surface stability.

5. Reconstruct the landscape to the approximate original contour or a contour consistent with the land use plan.

6. Maximize geomorphic stability and topographic diversity of the reclaimed topography.

7. Eliminate high walls, cut slopes, and/or topographic depressions on site, unless otherwise approved.

8. Reconstruct drainage basins and reclaim impoundments to maintain the drainage pattern, profile, and dimension to approximate the natural features found in nearby naturally functioning basins.

9. Reconstruct and stabilize stream channels, drainages, and impoundments to exhibit similar hydrologic characteristics found in stable naturally functioning systems.

10. Minimize wind, sheet and rill erosion on/or adjacent to the reclaimed area.

11. There shall be no evidence of mass wasting, head cutting, large rills or gullies, down cutting in drainages, or overall slope instability on/or adjacent to the reclaimed area. Site selection is the favorable method to avoid these issues.

12. Protect seed and seedling establishment (e.g., erosion control matting, mulching, hydro-seeding, surface roughening, fencing, etc.).

## II. Recommendations for suitable soil stockpiling to maintain soil quality

Suitable soil for reclamation will be stockpiled on the site for use in future site reclamation and will be addressed by the Operator in the site-specific reclamation plan in the APD approved by the BLM.

## III. Describe soil amendments

a. Soil amendment(s) may be used in reclamation if the soil is lacking the necessary chemical, biological, physical and /or organic materials to support sustaining growth of suitable plant materials. The soil type, soil characteristics (see A., ii. b), geographic location, along with soil mapping resources available should provide the information necessary to define the soil amendment.

b. The Operator should state what applying soil amendments is intended to accomplish. Soil amendment plans should be provided, including what amendments will be applied, method of application, timing relative to other reclamation activities (i.e. stockpiling, seeding, ripping).

c. The soil type is defined by the soil samples obtained prior to or in some cases after disturbance takes place. Soil amendments must be scientifically calculated based on the soil characteristics (see A., ii. b) so as to provide the most cost efficient and best assurances for successful reclamation.

d. Soil amendments include but are not limited to the following: Weed free grass hay, weed free wood chips or other weed free cellulosic materials, gypsum, elemental sulfur, and fertilizer.

## IV. Describe seeding methods

a. Different plant species may require different conditions (e.g. seeding depth, seed scarification, mixing, and timing) for optimal germination success. Seeding methods should match germination characteristics of species in the seed mix and consider timing of planting to maximize germination and establishment of all reclamation species.

b. The Operator will describe when seeding will occur and specify the methods they will use for seeding, including differential handling for different species (e.g. broadcast vs. drilling vs. Imprinting), and seeding depth in the site-specific reclamation plan of the APD. Re-seeding may need to occur if invasive and/or noxious weeds prevent establishment of the seed mix. See Appendix A below for references.

## V. Seed mixes

1. The need to provide multifunctional and sustainable seed mixes for interim and final reclamation and soil stability is driven by a desire to increase potential for successful and timely re-vegetation and site stability. Plant diversity and habitat functionality are directly impacted by the seed choices applied to an area slated to be reclaimed or restored. To maintain as much stability and ecological function this section makes recommendations to specifically aid an operator's selection process. Please see Appendix A for references.

    1. Select site-appropriate, adapted native plant materials based on the pre-disturbance plant community composition, site characteristics, and ecological setting. Seeds may be obtained from commercial sources of

certified weed-free seed mixes. Alternatively, local collections may be used provided they are collected in an area without weedy species.

2. Perennial naturalized species may be used when attempts to reclaim using native plants have not succeeded for a minimum of 2 full growing seasons. Reclamation should succeed using native species if soils are properly managed, precipitation is not limiting, seed mixes are carefully selected and seeded areas protected from grazing.

3. Based upon site-specific conditions, a decision may be made to use non-natives sooner than identified above and will be used in only unique conditions defined in the site-specific reclamation plan in the APD.

## VI. Describe if and how irrigation techniques will be used in the reclamation plan

a. Revegetation success is highly dependent on timing and amounts of precipitation. However, variable weather in Wyoming can limit or delay successful germination and establishment of plants. Irrigation can supplement natural precipitation to insure success of newly seeded site during the initial growth period of the plant. However, overuse of irrigation may result in plants that are dependent on supplemental water, therefore irrigation practices must be used carefully and conservatively.

b. Supplemental irrigation should be scientifically determined and applied.

c. Both soil and water samples should be tested before application and said water source should meet appropriate limits for sodium adsorption ratio and EC. Special consideration of soil chemistry and amendments will be a determining factor for the use of the source water.

d. Water must be utilized from permitted sources and should be permitted for such purposes. Produced water from sources, i.e. “coal bed natural gas wells” must adhere to discharge permits and be recognized by the Wyoming DEQ. Water utilized from sub surface water wells must be permitted and in good standing with State Engineers Office.

e. Irrigation can be cost prohibitive and should not be a requirement for reclamation but used as a tool to enhance vegetative growth.

## VI-I. Describe best management practices

Best Management Practices (BMPs) are techniques that can be applied to surface disturbance and reclamation actions to aid in reclamation success. Identify the appropriate BMPs during planning and they can guide the surface disturbance and reclamation process. Additionally, documenting BMPs provides opportunities to evaluate for success, so BMPs can be modified for future use in similar conditions. Please see Appendix A for BLM recommendations.

## VI-II. Description of monitoring and reporting protocols for reclamation rollover

a. Site Monitoring is conducted to observe and keep track of environmental conditions on the reclaimed site. Specifically, monitoring is done to document proper development of the reseeded plant community, soil stability and proper ecosystem function. Continued characterization after disturbance and during interim reclamation is appropriate for monitoring site maturation and stability, particularly when problematic soil conditions or invasive weeds are identified.

b. Vegetative monitoring and disturbed site evaluation for any component of the reclamation plan applicable to the APD shall take place at intervals agreed to by the BLM and the Operator with input by any entity who utilizes the surface estate (i.e. grazing permittee) of the disturbed site. Generally, the intervals for monitoring and reporting will be set annually by the BLM unless otherwise documented in the site-specific reclamation plan for the APD. The Interim Reclamation Objective (IRO) achievement by the Operator will reduce the mandatory monitoring and reporting described in the reclamation plan to a time period agreed to by the Operator and BLM and will be added to the site-specific reclamation plan by the BLM. Once the disturbed site achieves the IRO, the site will be subject to all applicable requirements of the reclamation plan until a time that the Final Reclamation Objective (FRO) is achieved by the Operator and approved by the BLM. Once the BLM has accepted the site for IRO status the BLM will also notify the Operator of the resulting acreage gained for reclamation rollover.

c. The IRO is to reconstruct and revegetate the portion of the disturbed land unused for long term production and establish the vegetative cover sufficient to maintain a healthy, biologically active topsoil; control erosion; and minimize habitat, visual and forage loss during the life of the well and/or facilities.

d. The long-term FRO is to return the land to a condition that which existed prior to disturbance with allowances for an improved and/or stable ecological condition, if possible. This includes reconstruction of the landform to its original state along with reestablishment of a stable vegetative community, hydrologic systems, visual resources, and wildlife habitats. To ensure that the FRO will be achieved and maintained through human and natural processes, actions will be taken to ensure standards are met for site stability, visual quality, hydrological functioning, and vegetative productivity beyond the end of the life of the well or facilities.

e. Monitoring should be designed and implemented by the Operator to document continuing successful interim reclamation for reclamation rollover using methodologies approved by BLM.

    1. Once the IRO is achieved and reclamation rollover granted by BLM, the Operator will continue to monitor the condition of the reclamation, document that the revegetation continues to meet IRO, and that the revegetation trajectory is toward achievement of FROs as defined in the site-specific reclamation plan approved by BLM.

    2. Identify potential problems and determine appropriate mitigation measures with the implementation of adaptive management.

f. The required elements of monitoring to assess IRO and FRO will be identified and will be addressed by the Operator in the site-specific reclamation plan in the APD approved by the BLM. Please see Appendix A for additional information.

## D. Indicators for successful achievement for the IRO resulting in reclamation rollover

### I. Beginning Monitoring

Monitoring should begin the first growing season. Evaluation is possible after a minimum of two full growing seasons.

### II. Irrigation and monitoring

If irrigation is used initially, then the reclamation may be evaluated for interim reclamation success two (2) full growing seasons after irrigation ceases to assure that the plant community can survive without supplemental water.

### III. The IRO reclamation rollover criteria is as depicted in the Rawlins Field Office Resource Management Plan (RMP) vs alternative criteria if this process is followed

The Current Rawlins Field Office RMP states "Criteria based on predisturbance surveys or surveys of adjacent undisturbed natural ground cover and species composition (The vegetation will consist of species included in the seed mix and/or occurring in the surrounding natural vegetation or as deemed desirable by BLM in review and approval of the reclamation plan. No single species will account for more than 30 percent total vegetative composition unless it is evident at higher levels in the adjacent landscape. Vegetation canopy cover production and species diversity shall approximate the surrounding undisturbed area) or –

- Eighty percent of predisturbance ground cover and ninety percent dominate species.

Should this pre-disturbance protocol be followed, it is our recommendation to provide an alternative to the above language and have revegetation cover be 70 percent of reference area cover to meet interim criteria. All of this 70 percent must be desirable perennial species as represented by the seed mix. Items D, I, ii and iv through ix would also need to be followed to interim reclamation criteria.

### IV. Monitoring results must be from a standardized cover/species protocol finalized by BLM

### V. Noxious weeds

No noxious weeds will be allowed.

### VI. Invasive weeds

Invasive weed species cover no greater than adjacent invasive species cover. All other undesirable perennial or annual plants as defined in the site-specific APD shall be continually controlled or eradicated on the original disturbed area.

### VI-I. Undesirable/annual plants

For purposes of successful IRO achievement, the amount of undesirable perennial or annual plant species shall be as represented in the site-specific reclamation plan and determined by vegetative monitoring of the disturbed area and will be addressed by the Operator in the site-specific reclamation plan in the APD approved by the BLM.

### VI-II. Vegetative trending

If vegetative trending is not positive within 3 full growing seasons without irrigation or 2 years after irrigation, the BLM and Operator will determine through adaptive management the needs for the disturbed site.

### IX. Erosion

Erosion features equal to or less than surrounding area.

## E. The monitoring data reporting required of the Operator as specified in the Rawlins RMP (with some additions to clarify and flow with document-original language in Appendix 36 of the Rawlins RMP)

Reclamation Monitoring Reporting Data required to be obtained and filed by the Operator.

| **General** |
|---|
| WYW# (Oil and Gas Lease or Right-of-Way (ROW)<br>Project Name:<br>Project Type (e.g. Well, Access Road, Pipeline, Facility, Wind)<br>Qtr/Qtr Sec, T, R, County, State |
| **Disturbance** |
| Disturbance Dates<br>Start-End<br>Reclamation Type (Interim/Final) |
| **Reclamation** |
| Earthwork Contractor Name<br>Earthwork Completion Date<br>Soil Preparation Ripping Depth (prior to re-spreading suitable soil)<br>Area (Acres or Square Feet)<br>Seeding Contractor Name<br>Seeding Date<br>Seedbed/Compaction Release Preparation Methods (Describe -Rip, Disc, Harrow, Parabolic, Depths) |
| **Seeding** |
| Seeding Method (Drill, Broadcast, Imprint, Depths)<br>Copy of Seed Tag (Species %, Purity %, Germination %)<br>Actual Seeding Rate (Lbs/Acre of each species)<br>Area Seeded (Acres or Square Feet)<br>Soil Amendments Used (Describe) |
| **Other** |
| Mulching/Erosion Netting/Tackifier used – yes/no and describe<br>Fenced Location yes/no<br>Snow Fencing yes/no |
| **Weeds** |

| |
|---|
| Type(s) of Weed Treated - List<br>Weed Contractor Name<br>Contractor License #<br>Weed Treatment Date<br>Weed Treatment Type (Chemical, Mechanical)<br>Chemicals Used and Rates Applied<br>Area Treated (Acres or Square Feet) (GIS Extent and Location) |
| **Inspection** |
| Inspector's Name, Company, ID<br>Inspection Date<br>Time after Seeding (which Growing season)<br>Seedlings/Square Feet Growing<br>Percent and Extent of Bare Soil (Describe)<br>Percent Ground Cover (Describe)<br>Percent Desirable Species (Describe)<br>Percent Noxious/Invasive Weeds (Describe)<br>Erosion Features Present? (Describe)<br>Evidence of Livestock Grazing (Describe)<br>Reclamation Successful (Yes/No) |
| **Reporting** |
| Completed Spreadsheet or Database as defined by BLM<br>GIS Layer With Attribute Table With Site Data as Detailed<br>Detail Disturbance Extent and Location<br>Permanent Photo Reference Point -Describe |
| **Monitoring** |
| Reference Photos<br>Close-Up Photos<br>Reseeding yes/no |
| **Future Management Prescription** |
| Weed Control Needed - yes/no and explanation<br>Erosion control Needed - yes/no and explanation<br>Grazing/Predation Issues - yes/no and explanation<br>Other Cultural or Mechanical Needs - yes/no and explanation<br>Record - yes/no and explanation |
| BLM Bureau of Land Management<br>GIS Geographic Information Systems<br>NRCS Natural Resources Conservation Service<br>USDA U.S. Department of Agriculture<br>USFS U.S. Forest Service<br>VRM Visual Resource Management |

## *Appendix A*

### A. Suggestions on Stockpiling Suitable and Unsuitable Soils to Maintain Soil Quality

Stockpiled topsoil should not be piled too deeply or too shallow. The taller or deeper the piles, the more soil is buried under large amounts of pressure resulting in compaction. Soil buried deep in the pile also has little exposure to oxygen resulting in anaerobiosis; deeply buried soil also has no organic matter input. Both of these problems reduce soil quality.

Shallow or small topsoil stockpiles have large footprints on the land surface with the disadvantage of covering greater areas of undisturbed soil which will, in turn, require revegetation, resulting in a greater overall amount of disturbed soil. Smaller or shallow stockpiles also have a greater surface area per amount of soil stored which increases

exposure of the stockpiled soil to wind and water erosion. The surface of soil stockpiles should always be vegetated to minimize erosion losses.

1. Salvaged stockpiles of suitable soil should be no deeper than 4 meters (13 feet) and should be less where possible.

2. Stockpile slopes should not exceed 5:1 angles (20 percent slopes) to allow for seeding and minimize erosion.

3. Suitable Soil stockpiles should be located in areas to prevent their disturbance and contamination by well pad activities. They should not be placed in streambeds or ephemeral drainages where they may be washed away. They should be protected from wind erosion.

4. A perimeter ditch/berm should be constructed around the stockpile for topsoil conservation and sediment control.

5. All suitable soil stockpiles should be seeded with native cool season grass to provide cover and protect them from water and wind erosion. Before seeding, the stockpile may be scarified along contours to minimize wind and water erosion.

6. If soil horizons or layers are to be stratified during soil salvage (stripping) operations, soil maps should be made of the well pad area to identify depths of soil horizons and surface slope. The pad area to be cleared of soils should then be divided into strips the size of the blades or equipment being used for soil removal. The depth of soil removal from each swath should be clearly marked so that equipment operators are removing a uniform layer from each strip. After the topsoil is removed from the area in this manner, the subsoil can then be removed in the same fashion, strip by strip, each strip at a uniform depth.

## B. Suggestions on Supplemental Irrigation

Supplemental irrigation should be scientifically determined and applied in the initial four to six week period of growth of the seedling plants and then ended. Such determination could be the application of an amount of irrigation water equivalent to the average or average plus 25 percent of the precipitation expected during a given interval.

## C. Suggestions on Vegetation and Soil Monitoring

Examples of monitoring components are listed below:

1. Reference: http://agriculture.wy.gov/forms/natres/rangelandmonitoring.pdf

2. Operators should use the same locations and methods used at baseline for repeat photography. Additional locations may be selected to document progress of reclaimed area to demonstrate interim and final reclamation success, and to monitor any identified problems such as erosional features. The site should be photographed once every year normally at the same time period, from the same locations and direction so that photographs are repeated through time. Photographs should be taken during the growing season.

3. Weed assessment: Disturbed and reclaimed areas should be evaluated for noxious and invasive weeds at least annually. Weed control should be promptly implemented by the Operator once weed species and infestations are identified. Weed control applied at planned chemical rates at times the weed is emerging can have positive impacts in minimizing weed growth through-out the year as well as promoting the growth of grass species. The timing of the control should be determined by the growth habits of the weed species and when they are most effectively assessed. If weeds persist, reseeding the site could be considered as well as the species of grass, forb or shrub.

4. Erosion control/soil stability: The reclaimed area should be evaluated for any signs of erosion problems annually and when the site is subject to erosional events. Identified erosion features should be monitored using repeat photography. Absence of erosion features is a positive indication that the soil is stabilizing.

5. Cover and composition data should be used to document that the plant community continues to trend toward the requirements to achieve interim and final reclamation success. The data should be used to evaluate if species composition and cover are increasing. These factors should be considered relative to the number of species in the seed mix, the selected reference area, and offsite responses to seasonal growing conditions.

6. Plant community cover and composition measurements: The Operator should start collecting cover and composition data beginning in the first (1st) growing season after disturbance. Data should be collected using repeatable methods approved by the appropriate regulatory authority (BLM) and should be the same methods that were used to describe vegetation for baseline (or reference area). The same methods should be used each time the vegetation is monitored.

7. Soils should be monitored if reclamation problems suggest that soils might be the problem. Such problems include but are not limited to salt crusts, clay crusts, wind and/or water erosion and rapid changes in pH (up or down) Recommended soil monitoring would include sampling soils and analysis of soil characteristics as described in the Development of a comprehensive plan section.

## D. Web Links

| Equipment |
|---|
| Equipment — http://www.reveg-catalog.tamu.edu<br>Equipment — http://www.nsl.fs.fed.us/great_basin_native_plants.html<br>Mats — www.newparkmats.com<br>Electric fence — www.hcam.net<br>SpiderPlow — www.spiderplowinternational.com<br>Truax — http://www.truaxcomp.com/ |
| **Government** |

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|---|
| 2006 Gold Book — http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html<br>BLM engineering drawings, roads & fences — http://www.blm.gov/nstc/eng/draw.html<br>BLM VRM — http://www.blm.gov/nstc/VRM/<br>BLM NSTC — http://www.blm.gov/nstc/<br>EPA — http://www.epa.gov/owow/nps/ and http://www.blm.gov/bmp/<br>New Onshore Order #1, May 7-07 — http://a257.g.akamaitech.net/7/257/2422/01jan20071800/edocket.access.gpo.gov/2007/pdf/07-934.pdf<br>Wyoming BLM requirements — http://www.wy.blm.gov/minerals/og/<br>Wyoming Climate Atlas — http://www.wrds.uwyo.edu/sco/climate_office.html<br>Wyoming DEQ — http://deq.state.wy.us/wqd/watershed/nps/npspg.htm<br>NRCS fotog — http://efotg.nrcs.usda.gov/treemenuFS.aspx |
| **Journals** |
| American Society of Mining and Reclamation — http//dept.ca.uky.edu/asmr/W/<br>Global Restoration Network — www.globalrestorationnetwork.org<br>Journal Range Management archives — http://jrm.library.arizona.edu/jrm/<br>National Roadside Vegetation Management Association — http://www.nrvma.org<br>Society for Ecological Restoration (SER) — http://www.ser.org/<br>USFS Rocky Mountain Research Station publications — http://www.treesearch.fs.fed.us/pubs/rmrs/<br>Wyoming Native Plant Society — http://uwadmnweb.uwyo.edu/wyndd/wnps/plant_id.htm |
| **Maps/GIS** |
| Topo & aerial photos — http://geonames.usgs.gov/pls/gnispublic/f?p=171:1:6176131719238320356<br>NRCS National Water and Climate Center — http://www.wcc.nrcs.usda.gov/wcc.html<br>Water Erosion Prediction project — http://octagon.nserl.purdue.edu/weppV1/<br>Wyoming Geographic Information Science Center — http://www.wygisc.uwyo.edu/ |
| **Mycorrhizae** |
| http://mycorrhiza.ag.utk.edu/default.html<br>http://invam.caf.wvu.edu/index.html<br>http://www.ars.usda.gov/is/pr/2003/030205.htm |
| **Oil/Gas** |
| Completion and workover wastes — http://www.epa.gov/epaoswer/other/oil/w&c.pdf<br>Dust suppression — http://www.oznet.ksu.edu/Stevenson/Dust%20Manual%20%20102704.pdf<br>Hydraulic Fracturing (Fracking or Frac Job) — http://www.earthworksaction.org/pubs/DrinkingWaterAtRisk.pdf<br>http://www.epa.gov/safewater/uic/cbmstudy/pdfs/completestudy/ch4_6-8-04.pdf<br>National LTAP & TTAP Rural Roads — http://www.ltapt2.org/resources/ruralresources.php<br>Oil & Gas Production wastes — http://www.epa.gov/epaoswer/other/oil/oil-gas.pdf<br>Power lines — http://www.aplic.org/<br>Produced water — http://www.iogcc.state.ok.us/PDFS/2006-Produced-Water-Guidebook.pdf<br>The $T^2$/LTAP Center University of Wyoming — http://wwweng.uwyo.edu/wyt2/<br>Western Governors CBM BMPs — http://www.westgov.org/wga/initiatives/coalbed/CoalBedMethane.pdf<br>Wyoming Oil and Gas Commission requirements — http://wogcc.state.wy.us/ |
| **Restoration Handbooks** |
| Bags Quiet Presence NRCS — http://www.wy.nrcs.usda.gov/Plant/tech_notices.html<br>Dryland pastures — http://www.montana.edu/wwwpb/pubs/eb19.pdf<br>Handbook of Western Reclamation Techniques — http://cbmcc.org/intro06.pdf<br>Restoring Western Ranges and Wild lands — http://www.fs.fed.us/rm/pubs/rmrs_gtr136.html<br>Solid Minerals reclamation handbook — http://www.blm.gov/nhp/efoia/wo/fy01/ib2001-081attach.pdf |
| **Scientific Literature** |

| |
|---|
| An Introduction to using native plants in Restoration — http://www.wy.nrcs.usda.gov/Plant/tech_notices.html<br>Geology and Plant life — http://www.wy.nrcs.usda.gov/Plant/tech_notices.html<br>Managing Arid and semi-arid watersheds — http://www.wy.blm.gov/botany/wyspecies.htm<br>http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/oil.html<br>Revegetation Abstracts — http://www.wy.nrcs.usda.gov/Plant/tech_notices.html<br>Sagebrush — http://sagemap.wr.usgs.gov/sage_grouse_documents.htm<br>Salt tolerant plants — http://www.ussl.ars.usda.gov/pls/caliche/Halophyte.query<br>USDA Plant database — http://plants.usda.gov/<br>Wyoming Natural Diversity Database — http://uwadmnweb.uwyo.edu/wyndd/<br>Wyoming Plant Materials Technical notes — http://www.wy.nrcs.usda.gov/Plant/tech_notices.html<br>Wyoming Reclamation and Restoration Center — http://uwadmnweb.uwyo.edu/WRRC/ |
| **Seed Sources** |
| Guidebook to Great Basin seeds —<br>http://www.id.blm.gov/techbuls/05_04/entiredoc.pdf<br>http://www.graniteseed.com/<br>http://uwacadweb.uwyo.edu/seedlab/default.htm<br>http://www.windriverseed.com/<br>http://www.pawneebuttesseed.com/<br>http://www.westernnativeseed.com/<br>http://www.avseeds.com/company.cfm<br>native@rmnativeplants.com<br>www.graniteseedcom<br>Native Plant Propagation Protocols — http://www.nativeplants.for.uidaho.edu/network<br>Native Seed Network — http://www.nativeseednetwork.org/index<br>Oregon state Seed Lab - quality testing of native seed — www.seedlab.oscs.oregonstate.edu<br>Seed testing protocols — http://wwwaosaseed.com/reference.htm |
| **Snow Fence** |
| http://www.snow-snake.com/ |
| **Soil** |
| Glossary of Soil Science Terms — https://www.soils.org/sssagloss/?check<br>NRCS Web Soil Survey —<br>http://www.wy.nrcs.usda.gov/Plant/tech_notices.html<br>http://www.nrcs.usda.gov/<br>http://soils.usda.gov/sqi/concepts/soil_biology/index.html<br>NRCS Soil Quality Publications — http://www.wy.nrcs.usda.gov/Plant/tech_notices.html<br>Soil series name search — http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdnamequery.cgi |
| **Weeds** |
| Halogeton — http://64.233.161.104/search?q=cache:jIdL39NFvUEJ:wfrc.usgs.gov/pubs/journalpdf/dudabiolfertilsoils.pdf+halogeton+competition&hl=en<br>Weed Science Society of America — http://www.wssa.net<br>TNC Invasive species (weeds) — http://tncweeds.ucdavis.edu/control.html |
| **Wildlife** |
| Important Wildlife Habitats — http://gf.state.wy.us/downloads/pdf/og.pdf<br>Sage grouse range wide forum links: http://sagegrouse.ecr.gov/?link=110<br>Recommendations for Development of Oil and Gas Resources within Crucial and Important Habitats — http://gf.state.wy.us/downloads/doc/O&G%20Recommendations%20April%202010%20with%20changes%20identified.pdf |

## E. Participants

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# Appendix H. Required Design Features and Best Management Practices

Adverse environmental impacts associated with development can be avoided, reduced, or mitigated through the project's design and implementation. In order to provide regulatory certainty that the measures will be incorporated, they must be required of every project. The National Technical Team (NTT) report identified management actions and practices that would reduce adverse impacts to greater sage-grouse if mandated to development throughout either Core Area (priority habitat) or occupied greater sage-grouse habitat or general habitat areas. Some of these practices are incorporated in Alternative D as being universally appropriate. The ones that could be analyzed on a planning area-wide basis have been made a part of the management actions and in this appendix as Required Design Features.

Other environmental protection measures could not be analyzed in a resource area-wide Environmental Impact Statement (EIS) because their appropriateness depends upon site-specific issues such as proximity to the boundary of Core Area or non-crucial habitat or engineering or physical limitations such as an oil and gas producing zone being too close to the surface to be recoverable through directional drilling. These best management practices (BMPs) are required to be considered in a site-specific project's design to reduce, prevent, or avoid adverse environmental or social impacts. These practices are analyzed to help ensure that development is conducted in an environmentally responsible manner. Some BMPs are as simple as choosing a paint color that helps oil and natural gas equipment blend with the natural surroundings, turning development less visible. Other BMPs may reduce the amount of vegetation lost to development, improve the speed of re-growth of desirable vegetation, or may reduce the amount of wildlife disturbance in important habitats. Public land users are encouraged to review these practices, incorporate them where appropriate, or develop better methods for achieving the same goal. However, the Bureau of Land Management (BLM) may also require their incorporation into the design features of the project as a Condition of Approval (COA). Only when the design feature is part of the BLM authorization as a COA, should the National Environmental Policy Act (NEPA) analysis of the project analyze the beneficial impacts of the design feature. If the practice is only voluntary or suggested, the BLM lacks the authority to require its implementation, so the project should be analyzed as if the practice will not occur. The BLM authorization will make clear whether the BMP is mandatory (attached as a COA) or merely encouraged.

NEPA analysis that concludes that BMPs should not be attached as mandatory COAs needs to clearly explain why with relation to site-specific factors. The purpose of this section is not to select certain practices or designs and require that only those be used. It is not possible to evaluate all the known practices and make determinations as to which are best, particularly without a specific project in a specific location. BMPs should be matched and adapted to meet the site-specific requirements of the management action, project and local environment. No one management practice is best suited to every site or situation, or will remain the most optimal practice over time. BMPs must be adaptive and monitored regularly to evaluate effectiveness.

As discussed more fully in the *Special Status Species-Wildlife* section, protections for the greater sage-grouse are an important focal point in the preparation of the Resource Management Plan (RMP), in part because of the importance of the Lander habitat for the survival and recovery of the species. Accordingly, a special section of BMPs identifies management that should be considered in both greater sage-grouse Core Area and general greater sage-grouse habitat. It

is expected that these BMPs will change over time as monitoring and further study develop improved greater sage-grouse protections.

## Required Design Features

The following design approaches are required for all projects unless the proponent establishes that due to site limitations or engineering considerations, the design approaches are infeasible. Economic considerations such as increased costs do not render a design infeasible.

**Greater Sage-Grouse Protection Required Design Features for All Projects:**

The following measures, and others as they are identified, will be required for all BLM-authorized development. As appropriate, they may be required as part of the design of the project or as a mandatory COA. Other greater sage-grouse protections are identified below as BMPs which will be evaluated on a site-specific basis for inclusion as a mandatory COA.

*General:*

- In applying protections for greater sage-grouse protections, all projects must evaluate (1) whether the conservation measure is reasonable (see 43 Code of Federal Regulations [CFR] 3101.1-2 for the definition of "reasonable" for fluid mineral leases) and consistent with valid existing rights, and (2) whether the action is in conformance with the RMP. Each conservation measure will be evaluated on a site-specific basis for likely effectiveness on a cost-benefit basis.
- In Core Area, where development would result in the long-term loss of greater sage-grouse habitat, identify effective mitigation that will be applied for a sufficient term as to constitute replacement habitat. Example: Purchase private land and mineral rights in the priority area and deed to the United States, or obtain a conservation easement in perpetuity. Consider compensatory mitigation and monitoring of significant direct, indirect, and cumulative impacts on, and loss of habitat for greater sage-grouse.
- When additional mitigation is necessary, conduct it in Core Area in the same greater sage-grouse population area. If Core Area does not provide appropriate mitigation, conduct offsite mitigation in general greater sage-grouse habitat with the ability to increase greater sage-grouse populations.
- Designate a qualified biologist who will be responsible for overseeing compliance with all design features related to the protection of ecological resources throughout all project phases, particularly in areas requiring avoidance or containing concentrated greater sage-grouse populations. This person shall be approved by the BLM.

*Facilities and Surface Disturbance:*

- Give overall consideration to minimizing the adverse impact to greater sage-grouse through a project design that avoids, minimizes, reduces, rectifies, and/or adequately compensates for direct and indirect impacts to greater sage-grouse habitat or use. Apply a phased development approach with concurrent interim reclamation. Locate and design individual project facilities to minimize disruption of animal movement patterns and connectivity of habitats.
- Subject to topographic and other environmental constraints, require development for a project wholly or partially in Core Area to be placed in the area least harmful to greater sage-grouse based on vegetation, topography, or other habitat features.
- Co-locate new development (facilities, pipelines, etc.) in existing disturbances or in areas where reclamation success has not been fully achieved unless the proponent establishes that this is technically unfeasible. Cluster disturbances, operations (hydraulic fracture stimulation,

liquids gathering, etc.), and facilities. Co-locate powerlines, flowlines, and small pipelines under or immediately adjacent to existing roads. Design or site permanent structures to minimize impacts to greater sage-grouse, with emphasis on locating and operating facilities that create movement (e.g., pump jacks) or attract frequent human use and vehicular traffic (e.g., fluid storage tanks) in a manner to minimize disturbance of greater sage-grouse or interference with habitat use.

- Locate new compressor stations outside priority habitats and require a design that reduces noise directed toward priority habitat unless the proponent can establish that this requirement would preclude development of the lease.
- Properly contain and promptly remove refuse to avoid attracting predators.
- Use mats for drilling activities where topography permits to reduce vegetation disturbance, and as temporary roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment.
- Restrict the construction of tall facilities, distribution powerlines, fences, and other infrastructure to the minimum number and amount needed. Place facilities such as tanks, which could serve as greater sage-grouse predator perches, outside of Core Area unless the proponent establishes that this technically is unfeasible. Equip tanks and other aboveground facilities with structures or devices that discourage nesting of ravens and raptors.
- Site and/or minimize linear features to reduce disturbance and fragmentation of greater sage-grouse habitats.
- Install greater sage-grouse safe fences around sumps, pits, and other trenching.
- Evaluate whether the benefits to greater sage-grouse from burying powerlines would outweigh the potential loss of habitat from the disturbance associated with burying the line, considering the potential threat from invasive nonnative species (INNS), low reclamation potential, and other factors. If the benefits outweigh potential adverse impacts, require that the powerlines be buried unless the applicant establishes that burying the lines is not technically feasible.
- Use remote monitoring techniques for production facilities, where applicable, and develop a plan to reduce vehicular traffic and human presence.
- Properly contain and promptly remove refuse to avoid attracting predators.
- Cover all fluid-containing pits and open tanks with netting (maximum 1.5-inch mesh size).
- Locate all residential development for employees and contractors ("man camps") outside of Core Area.

*Reclamation:*

- Where native shrubs located on lands proposed to be disturbed are unique and desirable for interim and final reclamation purposes, and the seed supply for these desirable brush species is not commercially available, seeds will be collected from the area and stored using the procedures of the Seeds of Success program. Seedlings or plugs of common dominant species will be propagated, preferably locally, in preparation for use in portions of area to be reclaimed to expedite vegetation recovery.
- Maximize the area of interim reclamation on long-term access roads and well pads, including reshaping, topsoiling, and revegetating cut-and-fill slopes.
- Identify areas of sustainable plant communities and populations appropriate for the project as sources for native plant material and manage for use in reclamation and restoration work. Prioritize native seed allocation for use in priority greater sage-grouse habitat in years when preferred native seed is in short supply.
- Utilize enhanced reclamation if needed to support more rapid interim and final reclamation including irrigation, mulching, soil amendments, and erosion blankets.

- When reseeding, use appropriate seed mixes and consider the use of appropriate subspecies of sagebrush seed. Continue to evaluate seed mixtures over time, considering potential changes in climate (Miller et al. 2011) when proposing seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed (Kramer and Havens 2009).
- Include reclamation or post-fire restoration objectives requiring that greater sage-grouse habitat needs are adequately addressed, and monitoring protocol to verify that the objectives are accomplished. Include greater sage-grouse habitat parameters as defined by Connelly et al. (2000), Hagen et al. (2007), or if available, state greater sage-grouse conservation plans and appropriate local information in habitat restoration objectives. Make maintaining these objectives in priority greater sage-grouse habitat areas a high restoration priority.
- Identify and work with partners to increase native seed availability and work with plant material centers to develop new plant materials, especially the forbs needed to restore greater sage-grouse habitat.
- Choose native plant seeds for vegetation treatments based on availability, adaptation (site potential), probability for success, and the vegetation management objectives for the area covered by the treatment. Prioritize native seed allocation for use in Core Area in years when preferred native seed is in short supply.
- Make reestablishment of sagebrush and desirable understory plant cover (relative to ecological site potential) a high priority for restoration efforts. Write specific vegetation objectives to reestablish sagebrush cover and desirable understory cover.
- Implement interim reclamation as soon as feasible for all disturbed soils to the side of roadways and other long-term disturbances, reducing the disturbance to the smallest area possible.
- Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.
- Maximize the area of interim reclamation on long-term access roads and well pads, including reshaping, topsoiling, and revegetating cut-and-fill slopes.

*Impoundment Pond Design:*

- Identify permanent ponds so as to reduce the number of newly flooded sites, which have high productivity for mosquitoes. Avoid flooding flat terrain or low-lying areas.
- Design impoundment ponds to reduce attraction to breeding mosquitoes while considering attraction to other vectors of diseases such as blue tongue disease. Design parameters should include steepness of sides, avoidance of shallows less than 2 feet (60 centimeters), and reduction of rooted vegetation (both aquatic and uplands).
- Separate inflow and outflow areas to produce open water; avoid creating wetlands.
- Avoid down slope seepage or overflow (including from natural drainage). Line constructed ponds as necessary to avoid seepage. Prevent shallow surface inflow and accumulation of sediment that promotes aquatic vegetation through piping discharge into open water and lining channels.
- Line the overflow spillway with crushed rock, and construct the spillway with steep sides to preclude the accumulation of shallow water and vegetation.
- Fence pond sites to restrict access by livestock and other wild ungulates that trample and disturb shorelines, enrich sediments with manure, and create hoof print pockets of water that are attractive to breeding mosquitoes.

*Roads:*

- Locate roads to avoid important habitats for greater sage-grouse and other wildlife. Construct, improve, and maintain access roads to minimize potential wildlife/vehicle collisions and facilitate wildlife movement through the project area.
- Apply dust abatement on roads, well pads, and other surface disturbances. Use of dust abatement with limited adverse impacts to vegetation, cultural resources, water quality, and other resources.
- When responding to a request for a road, develop a transportation plan on a landscape scale so as to consider all parties who will be authorized to use the road.
- Limit route construction to realignments of existing designated routes if that realignment has a minimal impact on greater sage-grouse habitat, eliminates the need to construct a new road, or is necessary for motorist safety.
- Identify measures to reduce the use of motorized vehicles to reduce adverse impacts to wildlife.
- Design roads to minimize total disturbance to the smallest amount possible and to the lowest standard while meeting road objectives or purpose including safety. Establish speed limits that will reduce vehicle speed to reduce greater sage-grouse mortality.
- If road crossings of linear water features (such as ephemeral, intermittent, and perennial streams) cannot be avoided, construct crossings to minimize impacts to the riparian-wetlands habitat. Usually this will mean crossing the feature at right angles. Temporary, portable bridges should be considered.
- Limit the use of new roads associated with development including not making it part of the public road network or implementing seasonal closures. Restrict motorized vehicle use to authorized users using signage, gates, and other devices.
- Establish slow speed limits on BLM-administered roads or design roads for slower vehicle speeds to reduce greater sage-grouse mortality and other wildlife conflicts.
- During travel management implementation, close and rehabilitate duplicate roads and rights-of-way (ROWs) no longer being utilized. When restoring original landform and establishing desirable vegetation, use appropriate seed mixtures or transplants as provided above and in Appendix D (p. 1477). Identify roads where the risk of vehicle or human-caused wildfires and the spread of invasive species into greater sage-grouse habitats could be minimized by planting perennial vegetation (e.g., green-strips) paralleling road ROWs (this BMP could be applied to BLM linear ROW authorizations).

*Fire:*

- Locate wildfire suppression facilities (i.e., base camps, spike camps, drop points, staging areas, and heli-bases) in areas where physical disturbance to greater sage-grouse habitat can be minimized. These include disturbed areas, grasslands, near roads/trails, or in other areas where there is existing disturbance or minimal sagebrush cover.
- Develop state-specific greater sage-grouse reference information and resource materials containing maps, a list of resource advisors, contact information, local guidance, and other relevant information. Provide localized maps to dispatch offices and extended attack incident commanders for use in prioritizing wildfire suppression resources and designing suppression tactics.
- Where applicable, utilize retardant and mechanized equipment to minimize burned acreage in Core Area during an extended attack.
- As safety allows, conduct mop-up where the black adjoins unburned islands, dog legs, or other habitat features to minimize sagebrush loss.
- Minimize unnecessary cross-country vehicle travel during fire operations in greater sage-grouse habitat.

- Prior to the fire season, provide greater sage-grouse training to resource advisors.
- Vegetation treatment: Power-wash all vehicles and equipment involved in vegetation treatment activities prior to entering the area to minimize the introduction of undesirable and/or invasive plant species.

*Vegetation Treatment and Fuels Management:*

- Design vegetation treatments in areas of high wildfire frequency to facilitate firefighter and public safety; reduce the risk of extreme fire behavior; and reduce the risk and rate of fire spread to greater sage-grouse habitats while facilitating the restoration of key habitats.
- Design fuels treatment objectives to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patterns that most benefit greater sage-grouse habitat.
- Provide training to fuels treatment personnel on greater sage-grouse biology, habitat requirements, and identification of areas utilized locally.
- Use fire prescriptions that minimize undesirable effects on vegetation or soils (e.g., minimize mortality of desirable perennial plant species and reduce risk of hydrophobicity).
- Incorporate roads and natural fuel breaks into fuel-break design.
- Power wash all vehicles and equipment involved in fuels management activities prior to entering the area to minimize the introduction of undesirable and/or invasive plant species.
- Outside of priority habitat, give priority for implementing sagebrush restoration projects that are adjacent to priority habitat.
- As funding and logistics permit, restore habitat to a species composition characterized by perennial grasses, forbs, and shrubs.
- Do not reduce sagebrush canopy cover to less than 15 percent within a treatment polygon unless a vegetation management objective requires additional reduction in sagebrush cover to meet strategic protection of priority greater sage-grouse habitat and conserve habitat quality for the species.
- Ensure proposed sagebrush treatments are planned with interdisciplinary input from BLM and state wildlife agency biologists, and that treatment acreage is conservative in the context of surrounding greater sage-grouse seasonal habitats and landscape.
- In suitable greater sage-grouse habitat, the priority for vegetation treatments are those that conserve, enhance, or restore greater sage-grouse habitat, reduce fuels at strategic locations to minimize the size of wildfires and to limit loss of greater sage-grouse habitat. Remove conifers where they have encroached upon greater sage-grouse habitat. Reduce the density of conifers that have encroached into, but do not yet dominate, sagebrush plant communities.
- Minimize undesirable effects on vegetation or soils (e.g., minimize mortality of desirable plant species and reduce risk of hydrophobicity). Incorporate vegetation treatment standard operating procedures, such as those outlined in the 17 Western States Vegetation Programmatic EIS (PEIS), into treatments (BLM 2007c).
- Ensure that treatments are configured in a manner (e.g., strips) that promotes use by greater sage-grouse.
- Reestablish appropriate sagebrush species/subspecies and important understory plants relative to site potential. Identify priority plant species and collect seed of understory plants and sagebrush subspecies important to greater sage-grouse. Establish seed harvest areas that are managed for seed production and are a priority for protection from outside disturbances.
- Design vegetation treatments in greater sage-grouse habitats to strategically reduce wildfire threats in the greatest area. This could involve spatially arranging new vegetation treatments with past treatments, vegetation with fire-resistant serial stages, natural barriers, and roads to

constrain fire spread and growth. This could require vegetation treatments to be implemented in a more linear versus block design.
- Remove standing and encroaching trees within at least 100 meters of occupied greater sage-grouse leks and other habitats (e.g., nesting, wintering, and brood-rearing) to reduce the availability of perch sites for avian predators.
- Protect wildland areas from wildfire originating on private lands, infrastructure corridors, and recreation areas.
- Strategically place and maintain pretreated strips/areas (e.g., mowing, prescribed fire, herbicide application, and strictly managed grazed strips) to aid in controlling wildfire should wildfire occur near key habitats or important restoration areas (such as where investments in restoration have already been made).

*Mineral Development:*

- Give overall consideration to impacts to greater sage-grouse in applying technically feasible COAs. Selection and application of these measures shall be based on current science and research on the effects to important breeding, nesting, brood-rearing, and wintering areas. The Plan of Development or Plan of Operations, as applicable, shall address, at a minimum, the anticipated noise, density and amount of disturbance, mechanical movement (e.g., pump jacks), permanent and temporary facilities, traffic, phases of development over time, offsite mitigation, and expected periods of use associated with the proposed project. The NEPA analysis and authorization should identify seasonal habitats or typical project features related to potential greater sage-grouse impacts, such as drill mats that are not made a part of the COA, based on site-specific or project-specific considerations and the explanation of why these protections were not included.
- Where feasible, co-locate new development (facilities, pipelines, etc.) in existing disturbances. Cluster disturbances, operations (hydraulic fracture stimulation, liquids gathering, etc.), and facilities. Use drilling techniques to reduce surface disturbance in relation to the number of wells, where feasible. Place liquid-gathering facilities and compressor stations outside Core Area, unless the proponent can establish that this requirement would preclude development of the lease. Identify measures to reduce traffic in Core Area.
- To ensure comprehensive planning relative to greater sage-grouse conflicts, complete Master Development Plans or Plans of Development during planning and review of projects involving multiple proposed disturbances in Core Area.
- In Core Area, require closed-loop systems for drilling operations, with no reserve pits unless technically unfeasible.
- Require noise shields or other noise abatement devices when drilling during the lek, nesting, brood-rearing, and wintering seasons. Locate new compressor stations outside of Core Area if feasible, and require a design directed toward priority habitat that reduces noise.

*Miscellaneous:*

- Identify areas where acquisitions (including subsurface mineral rights) or conservation easements, would benefit greater sage-grouse habitat. Apply acquisition and disposal criteria from Appendix R (p. 1623).

## Best Management Practices

The following sources contain information regarding the development and implementation of BMPs. These references are not to be considered as exclusive sources of information; rather, they should be used as a starting point when evaluating specific BMPs during project design and implementation.

## Bureau of Land Management Best Management Practices Resources

*BLM BMPs:* This website provides an introduction to BLM BMPs with links to BLM contacts, specific resources, and other BMP links, and other resources related to BLM BMPs.
http://www.blm.gov/bmp/
See also http://www.oilandgasbmps.org/

*General Information for Oil and Gas BMPs:* This resource provides general information regarding BLM BMPs for oil and gas development. A sample of BMPs are provided with a brief description of types of BMPs and terminology.
http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/general_information.html

*BMP Frequently Asked Questions:* The link below provides responses to frequently asked questions regarding BLM BMPs.
http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/frequently_asked_questions.html

*BMP Technical Information:* The slide shows at the link below provide a detailed look at a menu of possible oil and natural gas development BMPs. These slide shows are only a starting point and are not intended to serve as a comprehensive list of BMPs.
http://www.blm.gov/nhp/efoia/wo/fy05/im2005-069.htm

*Oil and Gas Exploration – The Gold Book:* The publication *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (commonly referred to as The Gold Book) was developed to assist operators by providing information on the requirements for obtaining permit approval and conducting environmentally responsible oil and gas operations on federal lands and on private surface over federal minerals (split-estate). Split-estate surface owners will also find the Gold Book to be a useful reference guide. In 2007, the Gold Book was updated to incorporate changes resulting from the new Onshore Oil and Gas Order No. 1 regulations.
http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html

*Visual Resources:* There are numerous design techniques that can be used to reduce the visual impacts from surface-disturbing projects. The techniques described here should be used in conjunction with BLM's visual resource contrast rating process wherein both the existing landscape and the proposed development or activity are analyzed for their basic elements of form, line, color, and texture.
http://www.blm.gov/wo/st/en/prog/Recreation/recreation_national/RMS/3.html

*Renewable Energy Development BMPs:* The following resources provide information on BMPs related to renewable energy development.

- *Wind Energy Development PEIS:* The scope of the Wind Energy PEIS analysis includes an assessment of the beneficial and adverse environmental, social, and economic impacts; discussion of relevant mitigation measures to address these impacts; and identification of appropriate, programmatic policies and BMPs to be included in the proposed Wind Energy Development Program.
http://windeis.anl.gov/documents/fpeis/index.cfm

- *BLM Instruction Memorandum [IM] 2009-043, Rights-of-Way, Wind Energy:* This IM further clarifies the BLM Wind Energy Development policies and BMPs provided in the Wind Energy Development PEIS. http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2009/IM_2009-043.html

- *Record of Decision for the Geothermal Resource Leasing PEIS:* This Record of Decision provides a list of sample BMPs that have been collected from various BLM and United States Forest Service documents addressing geothermal and fluid mineral leasing and development, including RMPs, forest plans, and environmental reports for geothermal leasing and development. The document provides guidance on incorporating BMPs, as appropriate, into the geothermal permit application or as Conditions of Approval. http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/energy/geothermal_eis/final_programmatic.Par.90935.File.dat/ROD_Geothermal_12-17-08.pdf

- *Solar Energy Development PEIS:* This PEIS was issued July 24, 2012. Its policies and mitigation measures adopted as part of the proposed solar energy deployment program. The Solar Energy Development PEIS identifies for those that work in the solar industry, and stakeholders the best practices for deploying solar energy and ensuring minimal impact to natural and cultural resources on BLM-administered lands or other federal, state, tribal, or private lands. http://www.solareis.anl.gov/

## U.S. Environmental Protection Agency (EPA) BMP Resources

*Healthy Watersheds:* This resource provides conservation approaches and tools designed to ensure healthy watersheds remain intact. The website provides example approaches that are generally site-specific, and watershed managers are encouraged to use the examples as guidance in developing local conservation strategies. The website also supplies outreach strategies to encourage stakeholder engagement in conservation and protection of healthy watersheds. http://www.epa.gov/owow/nps/

*Storm Water BMPs:* This online menu provides BMPs designed to meet the minimum requirements for six control measures specified by the EPA's Phase II Stormwater Program. The control measures include public education, public involvement, illicit discharge detection and elimination, construction, post-construction, and pollution prevention/good housekeeping. The menu also provides case studies assessing the performance of various storm water BMPs. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm

*Pasture, Rangeland, and Grazing Operations BMPs:* The link below provides BMPs compiled by the EPA to prevent or reduce pollution associated with livestock grazing. Topics include practices to reduce methane production, managing nonpoint source pollution, controlled grazing, reducing animal feeding operation pollution, and manure management. http://www.epa.gov/oecaagct/anprgbmp.html

## U.S. Department of Agriculture – Natural Resources Conservation Service (NRCS) BMP Resources

*National Conservation Practice Standards:* This website provides links for national conservation practices developed by the NRCS on topics such as herbaceous wind barriers, feed management,

forest stand improvement, and irrigation management. The conservation practice standard contains information on why and where the practice is applied, and sets forth the minimum quality criteria that must be met during the application of that practice in order for it to achieve its intended purpose. http://www.nrcs.usda.gov/Technical/Standards/nhcp.html

*National Range and Pasture Handbook:* Developed by NRCS grazing land specialists, this handbook provides a source of expertise to guide cooperators in solving resource problems and in sustaining or improving their grazing lands resources and operations. http://www.glti.nrcs.usda.gov/technical/publications/nrph.html

## Wyoming Game and Fish Department BMP Resources

*Aquatic Invasive Species:* This resource provides information about how to recognize aquatic invasive species and how to avoid introducing them or spreading them through Wyoming's waters. The website contains links to external resources including a link to waterbodies in the United States currently known to be impacted by zebra and quagga mussels. The website also contains information about how to decontaminate equipment and watercraft suspected of harboring aquatic invasive species. http://gf.state.wy.us/fish/AIS/index.asp

*Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats:* This document provides recommendations for mitigation and management options that development companies and resource agencies can implement to minimize impacts to wildlife from oil and gas development. http://gf.state.wy.us/web2011/Departments/Wildlife/pdfs/HABITAT_OILGASRECOMMENDATIONS0000333.pdf

*Wildlife Protection Recommendations for Wind Energy Development in Wyoming:* This document provides recommendations for BMPs, avoidance, monitoring, research, and mitigation opportunities for developers and resource agencies to minimize impacts to wildlife from wind-energy development. http://gf.state.wy.us/web2011/Departments/Wildlife/pdfs/WINDENERGY_WILDLIFEPROTECTION0000703.pdf

## Forestry Best Management Practices

*Wyoming Forestry Best Management Practices:* This document provides recommendations for protecting water quality and forest soils. Some of the BMPs outlined in this document are listed below. http://slf-web.state.wy.us/oldsite/forestry/bmp2.aspx

**Road Construction and Maintenance:** The need for higher-standard roads can be alleviated through temporary road blockage, locked gate management, and seasonal weather restrictions.

**Number of Roads, Existing Roads:** Minimize the number of roads constructed in a watershed through comprehensive road planning, recognizing intermingled ownership and foreseeable future uses to avoid the creation of sediment, change of water temperature, or addition of unwanted nutrients. Use existing roads where practical, unless use of such roads would cause or aggravate an erosion problem. When using existing roads, reconstruct only to the extent necessary to provide adequate drainage and safety; avoid disturbing stable road surfaces.

**Road Design and Implementation:** Fit the road to the topography by locating roads on natural benches and following natural contours. Locate roads on stable geology, including well-drained

soils and rock formations that tend to dip into the slope. Avoid slumps and slide-prone areas characterized by steep slopes, toe slopes, natural drainage channels, highly weathered bedrock, clay beds, concave slopes, and hummocky topography, and rock layers that dip parallel to the slope. Avoid wet areas, including moisture-laden or unstable toe slopes, seeps, wetlands, wet meadows and natural drainage channels. Minimize earth-moving activities when soils appear excessively wet.

**Drainage:** Design roads to minimize disruption of natural drainage patterns. Provide adequate drainage, as part of the construction process, from the surface of all permanent and temporary roads. Design, install, and route road surface drainage features at adequate spacing to control erosion; steeper gradients require more frequent drainage features. Install road-drainage features above stream crossings to route discharge into filtration zones before it enters a stream or surface water. Use outsloped, insloped, or crowned roads and space road-drainage features so peak drainage flow on the road surface or in ditches will not exceed capacity. Provide energy dissipaters (rock piles, slash, log chunks, etc.) where necessary to reduce erosion at the outlet of drainage features. Cross drains, culverts, water bars, dips, and other drainage structures should not discharge onto erodible soils or fill slopes without outfall protection. Properly constructed drain drips can be an economical method of road surface drainage. Construct drain dips deep enough into the subgrade so that traffic will not obliterate them. Route road drainage through adequate filtration zones or other sediment settling structures to ensure sediment does not reach surface water.

**Runoff/Erosion Control:** Stabilize erodible, exposed soils by seeding, compacting, rip-rapping, benching, mulching, or other suitable means prior to seasonal runoff. Prevent downslope movement of sediment by using sediment catch basins, drop inlets, changes in road grade, headwalls, or recessed cut slopes. Keep slope stabilization, erosion, and sediment control work current with road construction. Complete or stabilize road selections within the same operating season. Maintain erosion-control features through periodic inspection and maintenance, including cleaning dips and cross drains, repairing ditches, marking culvert inlets to aid in location, and clearing debris from culverts.

**Debris and Excess Material Handling:** Haul all excess material removed by maintenance operations to safe disposal sites and stabilize these sites to prevent erosion. Avoid sidecasting and place debris, overburden, and other waste materials associated with construction and maintenance activities in a location to avoid entry into streams. Include these waste areas in soil stabilization planning for the road. Minimize sediment production from borrow pits and gravel sources through proper location, development, and reclamation.

**Cut and Fill Slopes:** This includes: construct cut and fill slopes at stable angles to prevent sloughing and other subsequent erosion. Design roads to balance cuts and fills or use full bench construction (no fill slope) where stable fill construction is not possible. Avoid incorporating potentially unstable woody debris in the fill portion of the road prism. Where possible, leave existing rooted trees or shrubs at the toe of the fill slope to stabilize the fill. At the toe of potentially erodible fill slopes, particularly near stream channels, pile slash in a row parallel to the road to trap sediment. When done concurrently with road construction, this is one method that can effectively control sediment movement, and it can provide an economical way of disposing of roadway slash. Limit the height, width, and length of "slash filter wind-rows" so wildlife movement is not impeded. Sediment fabric fences or other methods may be used if effective.

**Out/In Slopes:** Outsloped roads provide a means of dispersing water in a low-energy flow from the road surface. Outsloped roads are appropriate when fill slopes are stable, drainage will not flow directly into stream channels, and transportation safety can be met. For insloped roads, plan ditch gradients steep enough, generally greater than 2 percent but less than 8 percent, to prevent sediment deposition and ditch erosion. The steeper gradients may be suitable for more stable soils; use the lower gradients for less stable soils. Do not disturb roadside vegetation more than necessary to maintain slope stability and serve traffic needs.

**Weather Maintenance:** Grade road surfaces only as often as necessary to maintain a stable running surface and adequate surface drainage. Avoid cutting the toe of cut slopes when grading roads, pulling ditches, or plowing snow. When plowing snow, provide breaks in the snow berm to allow road drainage. Consider gates, barricades, or signs to limit use of roads during spring breakup to other wet periods. Avoid using roads during wet periods if such use would likely damage the road drainage features. When access requires crossing moist areas with a poor road base, cross only when the ground is frozen or dry to alleviate a rutted, poorly drained road. Upon completion of seasonal operations, ensure that drainage features are fully functional. The road surface should be crowned, outsloped, insloped, or waterbarred. Remove berms from the outside edge.

**Ditch Culverts:** For ditch relief culverts, construct catch basins with stable side slopes. Protect the inflow end of cross drain culverts from plugging and armor if in erodible soil. Where possible, install culverts at the gradient of the original ground slope; otherwise armor outlets with rock or anchor downspouts to carry water safely across the fill slope. Skew ditch relief culverts 20 to 30 degrees toward the inflow from the ditch to help maintain proper function.

**Stream Culverts:** When using culverts to cross small streams, install those culverts to conform to the natural stream bed and slope on all intermittent streams that support fish or that provide seasonal fish passage. Ensure fish movement is not impeded by using culverts with a suitable diameter for permanent stream crossings and during peak flows. Maintain a 1-foot minimum cover for culverts 15 to 36 inches in diameter, and a cover of one-third diameter for larger culverts to prevent crushing by traffic. Place culverts slightly below normal stream grade to avoid culvert outfall barriers. Do not alter stream channels upstream from culverts, unless necessary to protect fill or to prevent culvert blockage. Install culverts to prevent erosion of fill. Compact the fill material to prevent seepage and failure. Armor the inlet and/or outlet with rock or other suitable material where feasible. Consider dewatering stream-crossing sites during culvert installation. This can be done with a temporary diversion channel or a sandbag dam with a pump diversion.

**Stream Crossings:** Minimize the number of road stream crossings and choose stable stream-crossing sites. Minimize stream-channel disturbances and related sediment problems during necessary construction of road and installation of stream-crossing structures. Whenever possible, retain existing vegetation and organic material around stream crossings. Locate temporary construction bypass roads where the stream course will have minimal disturbance. Design stream crossings for adequate passage of fish (if present) and time construction activities to have minimum impact on water quality and fisheries. Consider oversized pipe when debris loading may pose problems. Ensure sizing provides adequate length to allow for depth of road fill. Do not place erodible material into stream channels and remove stockpiled material from high-water zones. Abutments and wingwalls should prevent material from spilling into the stream. Avoid unimproved stream crossings. When a culvert or bridge is not feasible, locate drive-through (ford) on a stable, rocky portion of the stream channel, such as a bedrock stream.

**Equipment Use:** Avoid operation of wheeled or tracked equipment within isolated wetlands, except when the ground is frozen. Tractor skid where compaction, displacement, and erosion will be minimized. Avoid tractor or wheeled skidding on unstable wet or easily compacted soils.

**Hazardous Substances/Weed and Pest Control:** Know and comply with regulations governing the storage, handling, application (including licensing of applicators), and disposal of hazardous substances. Follow all label instructions. Develop a contingency plan for hazardous substance spills, including cleanup procedures and notification of the state Department of Environmental Quality (DEQ). A Spill Prevention and Countermeasures Plan is required by federal law for storage of more than 1,320 gallons, and state law requires the reporting of spills over 25 gallons.

**Integrated Approach:** Use an integrated approach to weed and pest control, including manual, biological, mechanical, preventative, and chemical means. To enhance effectiveness and prevent transport into streams, apply chemicals during appropriate weather conditions (generally calm and dry) and during the optimum time for control of the target pest or weed.

**Prescribed Burning and Wildfire Suppression:** Protect soil and water from prescribed burning effects by maintaining soil productivity, minimizing erosion, and preventing ash, sediments, nutrients and debris from entering surface water. After an intense wildfire or prescribed burn, emergency rehabilitation may be necessary to minimize the loss of soil, prevent the deterioration of water quality, and to mitigate threats to life and property. Stabilize all areas that have significantly increased erosion potential or drainage patterns altered by suppression activities by installing water bars and other drainage diversions in fire roads, fire lines, and other cleared areas, seeding, planting, and fertilizing to provide vegetative cover, spreading slash or mulch to protect bare soil, repairing road damage, and clearing stream channels of debris deposited by suppression activities and scarification as necessary to encourage percolation on excessively burned soils.

## BMPs for Water Resources

BMPs would be appropriate for consideration when proposed activities are within groundwater zones 1-3, surface water zones 1-3, and sensitive aquifer systems identified through the use of the Wyoming Groundwater Vulnerability Assessment Handbook, or similar document updated over time. BMPs to mitigate impacts to water resources include, but are not limited to, the following:

- Use closed-loop drilling systems where technologically feasible.
- Reuse produced water for well completion activities and enhanced oil recovery operations using water.
- Do not use evaporation ponds or reserve pits in proximity to shallow aquifers. Reduce reliance on evaporation ponds in other locations and other forms of surface disposal.
- Line surface impoundment ponds (evaporation ponds or drilling pits) with synthetic liners and subsequently decommission them by removing all contaminants and liners, and reclaiming the area.
- Identify private water supply wells and implement appropriate protection measures for the affected aquifer(s), as necessary to prevent the introduction of contaminants into the well (e.g., site oil and gas wells at a distance necessary to prevent the introduction of contaminants into the drinking water supply well, collect baseline water quality data from the water supply well, etc.).
- Require a monitoring plan that includes collection of baseline and periodic water quality data from potentially affected drinking water supply wells, identification of parameters to monitor, reporting results to the BLM and well owners, and reporting to Wyoming DEQ any

contaminant in groundwater exceeding Wyoming DEQ (or EPA) Class I drinking water standards.

- Review the geology of shallow aquifers to determine well construction requirements, which may include cementing to surface and drilling with a fresh water mud system.
- Require surface casing and cement to a specific formation or depth to protect aquifers at depth that need protection.
- Set surface casing below the lower-most drinking water and set into a confining (e.g., shale) layer.
- Set an intermediate string of casing and cement in the event of deep aquifers.
- Require submittal of a well logging plan and document submittal plan to ensure proper well construction to protect groundwater.
- Review the geology of shallow aquifers in proximity to groundwater development activities to determine potential impacts to flow patterns supporting water elements such as fen, wetlands, springs, seeps, and ponds.
- Because of the age of the well or depth or other factor, require re-completions to comply with state and federal standards for new well construction; analyze cement bond logs associated with any existing well location within ¼-mile of completing a new well or re-completing an existing one; and identify how re-completed wells will be tested and monitored.

## BMPs for Greater Sage-Grouse Protections

Knowledge of BMPs for greater sage-grouse protections is an evolving field. As research is done on impacts of various kinds of activities, or the absence thereof, on greater sage-grouse, additional protections will be identified. While some of these will be generic enough to be applied planning area-wide, others will require site-specific analysis to determine if they are appropriate for inclusion as a mandatory COA. This BMP section of this appendix will be supplemented as technology and understanding of greater sage-grouse advance.

# Appendix I. Stipulations and Conditions of Approval in Designated Development Areas and in Non-Designated Development Areas

Conditions of Approval (COAs) and/or stipulations will be applied to surface-disturbing activities related to oil and gas and right-of-way (ROW) actions in the Lander Field Office planning area. Applicable wildlife timing limitation stipulation (TLS), controlled surface use (CSU), and site-specific requirements will be included as COAs/stipulations according to federal regulations and policies.

New oil and gas leases will have applicable wildlife TLS and CSU stipulations applied at the leasing stage. For protection of greater sage-grouse, raptors, and other migratory birds protected under the Migratory Bird Treaty Act, the Bureau of Land Management will apply TLS and/or CSU COAs/stipulations for their protection on surface use authorizations within designated development areas (DDAs). The need to apply COAs/stipulations for big game crucial winter range and site-specific requirements in DDAs will be analyzed through the National Environmental Policy Act process. Exceptions to the COAs/stipulations can be requested using the process identified in Appendix E (p. 1483). Emergency and safety situations related to operations and maintenance are exempt from the COAs/stipulations. Notification/reporting to the Authorized Officer for these situations are subject to applicable rules and regulations.

**Table I.1. Activities for Oil and Gas and ROW Operations, and Short-Term Operation and Maintenance Activities Subject to COAs/Stipulations**

| Activities | Entire Lander Field Office |
|---|---|
| All Preliminary Activities and/or Casual Use as Defined by Regulations | COA/stipulation does not apply |
| All Site Construction | COA/stipulation applies |
| All Drilling | COA/stipulation applies |
| All Completion | COA/stipulation applies |
| All Surface Facilities Installation Activities | COA/stipulation applies |
| All Pipeline/Flow Line Installation | COA/stipulation applies |
| Plug and Abandon Wells | COA/stipulation applies |
| Reclamation | COA/stipulation applies |
| New Soil-Disturbing Activities | COA/stipulation applies |
| Short-Term Well and Oil and Gas-related ROW Maintenance and Miscellaneous Activities<br>● Well pumper<br>● Inspections<br>● Minor facility repair (1-2 Days)<br>● Spill remediation<br>● Haul condensate and produced water<br>● Snow removal<br>● Weed control<br>● Written order/incident of non-compliance remediation<br>● Production sales and measurements | COA/stipulation does not apply |
| COAs Conditions of Approval<br>ROW Right-of-way | |

Wildlife TLS COAs/stipulations will not apply for long-term maintenance and operation activities within DDAs unless otherwise identified. TLS and site-specific COAs/stipulations will be applied to oil and gas and ROW maintenance and operation activities conducted outside of DDAs where the activity could disturb wildlife during critical times of the year. Identified non-emergency related maintenance and operation activities outside DDAs that could be disruptive to wildlife during the breeding, nesting/birthing, and winter periods would be subject to a TLS COA/stipulation. Table I.2, "Maintenance and Operation Activities for Oil and Gas and ROW Operations Outside DDAs Subject to COAs/Stipulations" (p. 1536), identifies the activities that would be subject to the TLS COA/stipulation.

**Table I.2. Maintenance and Operation Activities for Oil and Gas and ROW Operations Outside DDAs Subject to COAs/Stipulations**

| Activities | Designated Development Areas | Outside of Designated Development Areas |
|---|---|---|
| Other Well and Oil and Gas-related ROW Maintenance and Miscellaneous Activities*<br>● Replace and install production facilities<br>● Routine road maintenance<br>● Excavate temporary flare and completion pit<br>● Replace pipelines and flowline within lease/unit<br>● Workover/recompletion/ downhole maintenance<br>● General routine maintenance activities within lease/unit | COA/stipulation does not apply | COA/stipulation applies |
| ● Removing or replacing utility poles or facilities<br>● General routine maintenance activities<br>● Restringing powerlines<br>● Routine communication site maintenance<br>● Repair/replace pipelines | COA/stipulation applied on case-by-case basis | COA/stipulation applies |
| *Operation and maintenance activities described are not related to emergency and safety situations, but are considered routine actions.<br>COAs Conditions of Approval<br>ROW Right-of-way | | |

# Appendix J. Wyoming Standards for Healthy Rangelands

## Introduction

According to the Department of the Interior's final rule for grazing administration, effective August 21, 1995, the Wyoming Bureau of Land Management (BLM) State Director is responsible for the development of standards for healthy rangelands and guidelines for livestock grazing management on 18 million acres of Wyoming's public rangelands. The development and application of these standards and guidelines are to achieve the four fundamentals of rangeland health outlined in the grazing regulations (43 Code of Federal Regulations [CFR] 4180.1). Those four fundamentals are: (1) watersheds are functioning properly; (2) water, nutrients, and energy are cycling properly; (3) water quality meets State standards; and (4) habitat for special status species is protected.

Standards address the health, productivity, and sustainability of the BLM-administered public rangelands and represent the minimum acceptable conditions for the public rangelands. The standards apply to all resource uses on public lands. Their application will be determined as use-specific guidelines are developed. Standards are synonymous with goals and are observed on a landscape scale. They describe healthy rangelands rather than important rangeland by-products. The achievement of a standard is determined by measuring appropriate indicators. An indicator is a component of a system whose characteristics (e.g., presence, absence, quantity, and distribution) can be measured based on sound scientific principles.

Guidelines provide for, and guide the development and implementation of, reasonable, responsible, and cost-effective management practices at the grazing allotment and watershed level. The guidelines in this document apply specifically to livestock grazing management practices on the BLM-administered public lands. These management practices will either maintain existing desirable conditions or move rangelands toward statewide standards within reasonable timeframes. Appropriate guidelines will ensure that the resultant management practices reflect the potential for the watershed, consider other uses and natural influences, and balance resource goals with social, cultural/historic, and economic opportunities to sustain viable local communities. Guidelines, like standards, apply statewide.

Quantifiable resource objectives and specific management practices to achieve the standards will be developed at the BLM Field Office level and will consider all reasonable and practical options available to achieve desired results on a watershed or grazing allotment scale. The objectives shall be reflected in site-specific activity or implementation plans as well as in livestock grazing permits/leases for the public lands. Interdisciplinary activity or implementation plans will be used to maintain or achieve the Wyoming standards for healthy rangelands. These plans may be developed formally or informally through mechanisms available and suited to local needs (such as Coordinated Resource Management [CRM] efforts).

The development and implementation of standards and guidelines will enable on-the-ground management of the public rangelands to maintain a clear and responsible focus on both the health of the land and its dependent natural and human communities. This development and implementation will ensure that any mechanisms currently being employed or that may be developed in the future will maintain a consistent focus on these essential concerns.

These standards and guidelines are compatible with BLM's three-tiered land use planning process. The first tier includes the laws, regulations, and policies governing BLM's administration and management of the public lands and their uses. The previously mentioned fundamentals of rangeland health specified in 43 CFR 4180.1, the requirement for BLM to develop these state (or regional) standards and guidelines, and the standards and guidelines themselves, are part of this first tier. Also part of this first tier are the specific requirements of various federal laws and the objectives of 43 CFR 4100.2 that require BLM to consider the social and economic well-being of the local communities in its management process.

These standards and guidelines will provide for statewide consistency and guidance in the preparation, amendment, and maintenance of BLM land use plans, which represent the second tier of the planning process. The BLM land use plans provide general allocation decisions concerning the kinds of resource and land uses that can occur on the BLM administered public lands, where they can occur, and the types of conditional requirements under which they can occur. In general, the standards will be the basis for development of planning area-specific management objectives concerning rangeland health and productivity, and the guidelines will direct development of livestock grazing management actions to help accomplish those objectives.

The third tier of the BLM planning process, activity or implementation planning, is directed by the applicable land use plan and, therefore, by the standards and guidelines. The standards and guidelines, as BLM statewide policy, will also directly guide development of the site-specific objectives and the methods and practices used to implement the land use plan decisions.

Activity or implementation plans contain objectives which describe the site-specific conditions desired. Grazing permits/leases for the public lands contain terms and conditions which describe specific actions required to attain or maintain the desired conditions. Through monitoring and evaluation, the BLM, grazing permittees, and other interested parties determine if progress is being made to achieve activity plan objectives.

Wyoming rangelands support a variety of uses which are of significant economic importance to the state and its communities. These uses include oil and gas production, mining, recreation and tourism, fishing, hunting, wildlife viewing, and livestock grazing. Rangelands also provide amenities which contribute to the quality of life in Wyoming such as open spaces, solitude, and opportunities for personal renewal. Wyoming's rangelands should be managed with consideration of the state's historical, cultural, and social development and in a manner which contributes to a diverse, balanced, competitive, and resilient economy in order to provide opportunity for economic development. Healthy rangelands can best sustain these uses.

To varying degrees, BLM management of the public lands and resources plays a role in the social and economic well-being of Wyoming communities. The National Environmental Policy Act (part of the above-mentioned first planning tier) and various other laws and regulations mandate the BLM to analyze the socioeconomic impacts of actions occurring on public rangelands. These analyses occur during the environmental analysis process of land use planning (second planning tier), where resource allocations are made, and during the environmental analysis process of activity or implementation planning (third planning tier). In many situations, factors that affect the social and economic well-being of local communities extend far beyond the scope of BLM management or individual public land users' responsibilities. In addition, since standards relate primarily to physical and biological features of the landscape, it is very difficult to provide measurable socioeconomic indicators that relate to the health of rangelands. It is important that standards be realistic and within the control of the land manager and users to achieve.

Implementation of the Wyoming standards and guidelines will generally be done in the following manner. Grazing allotments or groups of allotments in a watershed will be reviewed based on the BLM's current allotment categorization and prioritization process. Allotments with existing management plans and high-priority allotments will be reviewed first. Lower priority allotments will then be reviewed as time allows. The permittees and interested public will be notified when allotments are scheduled for review and are encouraged to participate in the review. The review will first determine if an allotment meets each of the six standards. If it does, no further action will be necessary. If any of the standards aren't being met, rationale explaining the contributing factors will be prepared. If livestock grazing practices are found to be among the contributing factors, corrective actions consistent with the guidelines will be developed and implemented. If a lack of data prohibits the reviewers from determining if a standard is being met, a strategy will be developed to acquire the data in a timely manner.

## Standards for Healthy Public Rangelands

### Standard #1

Within the potential of the ecological site (soil type, landform, climate, and geology), soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff.

This Means That:

The hydrologic cycle will be supported by providing for water capture, storage, and sustained release. Adequate energy flow and nutrient cycling through the system will be achieved as optimal plant growth occurs. Plant communities are highly varied within Wyoming.

Indicators May Include But Are Not Limited To:

- Water infiltration rates
- Soil compaction
- Erosion (rills, gullies, pedestals, capping)
- Soil micro-organisms
- Vegetative cover (gully bottoms and slopes)
- Bare ground and litter

### Standard #2

Riparian and wetland vegetation has structural, age, and species diversity characteristic of the stage of channel succession and is resilient and capable of recovering from natural and human disturbance in order to provide forage and cover, capture sediment, dissipate energy, and provide for groundwater recharge.

This Means That:

Wyoming has highly varied riparian and wetland systems on public lands. These systems vary from large rivers to small streams and from springs to large wet meadows. These systems are in various stages of natural cycles and may also reflect other disturbance that is either localized or

widespread throughout the watershed. Riparian vegetation captures sediments and associated materials, thus enhancing the nutrient cycle by capturing and utilizing nutrients that would otherwise move through a system unused.

Indicators May Include But Are Not Limited To:

- Erosion and deposition rate
- Channel morphology and floodplain function
- Channel succession and erosion cycle
- Vegetative cover
- Plant composition and diversity (species, age class, structure, successional stages, desired plant community, etc.)
- Bank stability
- Woody debris and instream cover
- Bare ground and litter

**Standard #3**

Upland vegetation on each ecological site consists of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance.

This Means That:

In order to maintain desirable conditions and/or recover from disturbance within acceptable timeframes, plant communities must have the components present to support the nutrient cycle and adequate energy flow. Plants depend on nutrients in the soil and energy derived from sunlight. Nutrients stored in the soil are used over and over by plants, animals, and microorganisms. The amount of nutrients available and the speed with which they cycle among plants, animals, and the soil are fundamental components of rangeland health. The amount, timing, and distribution of energy captured through photosynthesis are fundamental to the function of rangeland ecosystems.

Indicators May Include But Are Not Limited To:

- Vegetative cover
- Plant composition and diversity (species, age class, structure, successional stages, desired plant community, etc.)
- Bare ground and litter
- Erosion (rills, gullies, pedestals, capping)
- Water infiltration rates

**Standard #4**

Rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitat. Habitats that support or could support threatened, endangered, species of special concern, or sensitive species will be maintained or enhanced.

This means that:

The management of Wyoming rangelands will achieve or maintain adequate habitat conditions that support diverse plant and animal species. These may include listed threatened or endangered species (U.S. Fish and Wildlife-designated), species of special concern (BLM-designated), and other sensitive species (State of Wyoming-designated). The intent of this standard is to allow the listed species to recover and be delisted.

Indicators May Include But Are Not Limited To:

- Noxious weeds
- Species diversity
- Age class distribution
- All indicators associated with the upland and riparian standards
- Population trends
- Habitat fragmentation

**Standard #5**

Water quality meets State standards.

This Means That:

The State of Wyoming is authorized to administer the Clean Water Act. BLM management actions or use authorizations will comply with all federal and state water quality laws, rules and regulations to address water quality issues that originate on public lands. Provisions for the establishment of water quality standards are included in the Clean Water Act, as amended, and the Wyoming Environmental Quality Act, as amended. Regulations are found in Part 40 of the CFR and in Wyoming's Water Quality Rules and Regulations. The latter regulations contain Quality Standards for Wyoming Surface Waters.

Natural processes and human actions influence the chemical, physical, and biological characteristics of water. Water quality varies from place to place with the seasons, the climate, and the kind substrate through which water moves. Therefore, the assessment of water quality takes these factors into account.

Indicators May Include But Are Not Limited To:

- Chemical characteristics (e.g., pH, conductivity, dissolved oxygen)
- Physical characteristics (e.g., sediment, temperature, color)
- Biological characteristics (e.g., macro- and micro-invertebrates, fecal coliform, and plant and animal species)

**Standard #6**

Air quality meets State standards.

This Means That:

The State of Wyoming is authorized to administer the Clean Air Act. BLM management actions or use authorizations will comply with all federal and state air quality laws, rules, regulations and standards. Provisions for the establishment of air quality standards are included in the Clean Air Act, as amended, and the Wyoming Environmental Quality Act, as amended. Regulations are found in Part 40 of the CFR and in Wyoming Air Quality Standards and Regulations.

Indicators May Include But Are Not Limited To:

- Particulate matter
- Sulfur dioxide
- Photochemical oxidants (ozone)
- Volatile organic compounds (hydrocarbons)
- Nitrogen oxides
- Carbon monoxide
- Odors
- Visibility

## BLM Wyoming Guidelines for Livestock Grazing Management

I. Timing, duration, and levels of authorized grazing will ensure that adequate amounts of vegetative ground cover, including standing plant material and litter, remain after authorized use to support infiltration, maintain soil moisture storage, stabilize soils, allow the release of sufficient water to maintain system function, and to maintain subsurface soil conditions that support permeability rates and other processes appropriate to the site.

II. Grazing management practices should restore, maintain, or improve riparian plant communities. Grazing management strategies consider hydrology, physical attributes, and potential for the watershed and the ecological site. Grazing management should maintain adequate residual plant cover to provide for plant recovery, residual forage, sediment capture, energy dissipation, and groundwater recharge.

III. Range improvement practices (instream structures, fences, water troughs, etc.) in and adjacent to riparian areas will ensure that stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform are maintained or enhanced. The development of springs, seeps, or other projects affecting water and associated resources shall be designed to protect the ecological and hydrological functions, wildlife habitat, and significant cultural, historical, and archaeological values associated with the water source. Range improvements will be located away from riparian areas if they conflict with achieving or maintaining riparian function.

IV. Grazing practices that consider the biotic communities as more than just a forage base will be designed in order to ensure that the appropriate kinds and amounts of soil organisms, plants, and animals to support the hydrologic cycle, nutrient cycle, and energy flow are maintained or enhanced.

V. Continuous season-long or other grazing management practices that hinder the completion of plants' life-sustaining reproductive and/or nutrient cycling processes will be modified to ensure adequate periods of rest at the appropriate times. The rest periods will provide for seedling establishment or other necessary processes at levels sufficient to move the ecological site condition toward the resource objective and subsequent achievement of the standard.

VI. Grazing management practices and range improvements will adequately protect vegetative cover and physical conditions and maintain, restore, or enhance water quality to meet resource objectives. The effects of new range improvements (water developments, fences, etc.) on the health and function of rangelands will be carefully considered prior to their implementation.

VI-I. Grazing management practices will incorporate the kinds and amounts of use that will restore, maintain, or enhance habitats to assist in the recovery of federal threatened and endangered species or the conservation of federally-listed species of concern and other state-designated special status species. Grazing management practices will maintain existing habitat or facilitate vegetation change toward desired habitats. Grazing management will consider threatened and endangered species and their habitats.

VI-II. Grazing management practices and range improvements will be designed to maintain or promote the physical and biological conditions necessary to sustain native animal populations and plant communities. This will involve emphasizing native plant species in the support of ecological function and incorporating the use of non-native species only in those situations in which native plant species are not available in sufficient quantities or are incapable of maintaining or achieving properly functioning conditions and biological health.

IX. Grazing management practices on uplands will maintain desired plant communities or facilitate change toward desired plant communities.

## Definitions

**Activity Plans** – Allotment Management Plans (AMPs), Habitat Management Plans (HMPs), Watershed Management Plans (WMPs), Wild Horse Management Plans (WHMPs), and other plans developed at the local level to address specific concerns and accomplish specific objectives.

**Coordinated Resource Management (CRM)** – A group of people working together to develop common resource goals and resolve natural resource concerns. CRM is a people process that strives for win-win situations through consensus-based decision making.

**Desired Plant Community** – A plant community which produces the kind, proportion, and amount of vegetation necessary for meeting or exceeding the land use plan/activity plan objectives established for an ecological site(s). The desired plant community must be consistent with the site's capability to produce the desired vegetation through management, land treatment, or a combination of the two.

**Ecological Site** – An area of land with specific physical characteristics that differs from other areas both in its ability to produce distinctive kinds and amounts of vegetation and in its response to management.

**Erosion** – (v.) Detachment and movement of soil or rock fragments by water, wind, ice, or gravity. (n.) The land surface worn away by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

**Grazing Management Practices** – Grazing management practices include such things as grazing systems (rest-rotation, deferred rotation, etc.), timing and duration of grazing, herding, salting, etc. They do not include physical range improvements.

**Guidelines (For Grazing Management)** – Guidelines provide for, and guide the development and implementation of, reasonable, responsible, and cost-effective management actions at the allotment and watershed level which move rangelands toward statewide standards or maintain existing desirable conditions. Appropriate guidelines will ensure that the resultant management actions reflect the potential for the watershed, consider other uses and natural influences, and balance resource goals with social, cultural/historic, and economic opportunities to sustain viable local communities. Guidelines, and, therefore, the management actions they engender, are based on sound science, past and present management experience, and public input.

**Indicator** – An indicator is a component of a system whose characteristics (e.g., presence, absence, quantity, and distribution) can be measured based on sound scientific principles. An indicator can be measured (monitored and evaluated) at a site- or species-specific level. Measurement of an indicator must be able to show change within timeframes acceptable to management and be capable of showing how the health of the ecosystem is changing in response to specific management actions. Selection of the appropriate indicators to be monitored in a particular allotment is a critical aspect of early communication among the interests involved on the ground. The most useful indicators are those for which change or trend can be easily quantified and for which agreement as to the significance of the indicator is broad based.

**Litter** – The uppermost layer of organic debris on the soil surface, essentially the freshly fallen or slightly decomposed vegetal material.

**Management Actions** – Management actions are the specific actions prescribed by the BLM to achieve resource objectives, land use allocations, or other program or multiple use goals. Management actions include both grazing management practices and range improvements.

**Objective** – An objective is a site-specific statement of a desired rangeland condition. It may contain qualitative (subjective) elements, but it must have quantitative (objective) elements so that it can be measured. Objectives frequently speak to change. They may measure the avoidance of negative changes or the accomplishment of positive changes. They are the focus of monitoring and evaluation activities at the local level. Objectives may measure the products of an area rather than its ability to produce them, but if they do so, it must be kept in mind that the lack of a product may not mean that the standards have not been met. Instead, the lack of a particular product may reflect other factors such as political or social constraints. Objectives often focus on indicators of greatest interest for the area in question.

**Range Improvements** – Range improvements include such things as corrals, fences, water developments (reservoirs, spring developments, pipelines, wells, etc.) and land treatments (prescribed fire, herbicide treatments, mechanical treatments, etc.).

**Rangeland** – Land on which the native vegetation (climax or natural potential) is predominantly grasses, grass-like plants, forbs, or shrubs. This includes lands revegetated naturally or artificially when routine management of that vegetation is accomplished mainly through manipulation of grazing. Rangelands include natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows.

**Rangeland Health** – The degree to which the integrity of the soil and ecological processes of rangeland ecosystems are sustained.

**Riparian** – An area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lakeshores and streambanks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not have vegetation dependent on free water in the soil.

**Standards** – Standards are synonymous with goals and are observed on a landscape scale. Standards apply to rangeland health and not to the important by-products of healthy rangelands. Standards relate to the current capability or realistic potential of a specific site to produce these by-products, not to the presence or absence of the products themselves. It is the sustainability of the processes, or rangeland health, that produces these by-products.

**Terms and Conditions** – Terms and conditions are very specific land use requirements that are made a part of the land use authorization in order to assure maintenance or attainment of the standard. Terms and conditions may incorporate or reference the appropriate portions of activity plans (e.g., AMPs). In other words, where an activity plan exists that contains objectives focused on meeting the standards, compliance with the plan may be the only term and condition necessary in that allotment.

**Upland** – Those portions of the landscape which do not receive additional moisture for plant growth from run-off, streamflow, etc. Typically these are hills, ridgetops, valley slopes, and rolling plains.

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# Appendix K. Livestock Grazing Allotments and Range Improvements

This appendix provides an overview of livestock grazing allotments including acreage and season of use; allotment categorization; and allotments assessed for standards and guidelines. In addition, it provides details of range improvement projects and the Bureau of Land Management's (BLM) approach to comprehensive grazing management strategies. The data are presented throughout the narrative and in the following six tables:

- Table K.1, "Grazing Allotments, Acres, Season of Use, and Animal Unit Months" (p. 1551)
- Table K.2, "Allotment Categorization – Current and Proposed" (p. 1563)
- Table K.3, "Lander Field Office Grazing Allotments Assessed for Meeting Standards" (p. 1569)
- Table K.4, "Allotment Management Plans and Rangeland Management Agreements Developed" (p. 1573)
- Table K.5, "Summary of Range Improvements Lander Field Office, 1986-2009" (p. 1576)
- Table K.6, "Animal Unit Months Authorized, 1989-2008" (p. 1581)

In 1985, the BLM established three categories for allotments to identify areas where management was needed, as well as to prioritize workloads and the use of range improvement dollars generated from the portion of grazing fees returned to the field office. See Chapter 4, *Fire and Fuels Management* for changes in the use of range improvement dollars. The categories and criteria used to place an allotment into each category are described below. Subsequently, in 2008, the BLM revised the definitions for these categories in Instruction Memorandum (IM) 2009–018, *Process for Setting Priorities for Issuing Grazing Permits and Leases*. The guidance makes clear that categorization is not done as part of a Resource Management Plan (RMP) revision and does not require an RMP amendment or maintenance action. However, part of the National Environmental Policy Act (NEPA) process associated with the RMP and Environmental Impact Statement (EIS) is to engage the public in scoping and providing input on management decisions. Accordingly, this appendix identifies information on grazing allotments to better inform the public on livestock grazing management on the allotment level. Any allotment specific decisions beyond analyzing closing as much as 12,839 acres to public grazing, would be analyzed on a site-specific basis as the procedures required by IM 2009–018 are implemented.

The categorization process now emphasizes ensuring that land health considerations are the primary basis for prioritizing the processing and issuing of grazing authorizations for use of allotments on public lands. A flow chart for the process of issuing grazing permits and leases establishes the process to be followed as outlined in IM 2009–018.

**Category I** – Allotments where current livestock grazing management or level of use on public land is, or is expected to be, a significant causal factor in the non-achievement of land health standards, or where a change in mandatory terms and conditions in the grazing authorization is or may be necessary. When identifying Category I allotments, review condition of critical habitat, conflicts with greater sage-grouse, and whether projects have been proposed specifically for

implementing the Healthy Lands Initiative. Some of these allotments might be administered by other BLM Field Offices.

**Category M** – Allotments where land health standards are met or where livestock grazing on public land is not a significant causal factor for not meeting the standards and current livestock management is in conformance with guidelines developed by the State Directors in consultation with Resource Advisory Councils. Allotments where an evaluation of land health standards has not been completed, but existing monitoring data indicates that resource conditions are satisfactory.

**Category C** – Allotments where public lands produce less than 10 percent of the forage in the allotment or are less than 10 percent of the land area. An allotment should generally not be designated Category C if the public land in the allotment contains: (1) critical habitat for a threatened or endangered species, and/or (2) riparian-wetlands adversely affected by livestock grazing.

Comprehensive grazing management strategies are first and foremost intended to maintain, and/or make substantial progress toward, fulfillment of the Wyoming Standards for Healthy Rangelands. Comprehensive grazing management strategies should include and consider defined resource management objectives for areas preferred by livestock, permitted use, class of livestock, livestock season of use, limits of flexibility, monitoring requirements, forage allocations necessary to support wildlife and wild horses, and the need for range improvements considerate of potential conflicts with other resource values. Existing permits that have already been fully processed under NEPA evaluating a range of grazing alternatives and existing functional Allotment Management Plans already include comprehensive grazing management strategies. The development of such a strategy will vary based on the identified management category for the grazing allotment as follows:

- Category "I" allotments will be prioritized for the development of comprehensive grazing strategies. The Lander Field Office will evaluate grazing strategies on I category allotments based on the following criteria.
    1. Carrying Capacity of the Allotment: Stocking rates will be established based on the current average forage production and availability considerate of forage requirements of wildlife and wild horse populations. Stocking rates must allow for adequate residual cover to dissipate energy, capture sediment, and support proper infiltration and soil moisture storage/release in support of ecological processes.
    2. Season of use: Grazing during the critical growing season and during the hot season will be required to be managed in a manner that allows for sufficient rest (e.g., rest/deferred rotation systems) to promote healthy, vigorous native plant communities and minimize soil loss and compaction.
    3. Class of livestock: If the current class of livestock is considered to be an important factor in non-fulfillment of the Wyoming Standards for Healthy Rangelands, a change in class of livestock will be considered to make substantial progress toward fulfillment of the Wyoming Standards for Healthy Rangelands. In the event a change in class of livestock is not feasible, stocking rates and/or the season of use shall be appropriately modified to make substantial progress toward fulfillment of the Wyoming Standards for Healthy Rangelands in consideration of the overall grazing strategy.
    4. Range Improvement Projects: Range improvement projects will be considered when existing range improvements have been satisfactorily maintained, the project has been found to be necessary for the establishment of modified grazing practices, and/or when the project has been designed to make substantial progress toward fulfillment of the

Wyoming Standards for Healthy Rangelands in conformance with the Lander RMP. All proposed range improvements will be evaluated for conflicts with other resource values and must be designed to mitigate impacts to any conflicting values. Resource values that will be evaluated for potential conflicts with range improvement projects include, but are not limited to, special status species, wild horses, critical wildlife habitats, cultural resources, National Historic Trail and Continental Divide National Scenic Trail corridors, recreation, designated Areas of Critical Environmental Concern, wilderness study areas, and lands with wilderness characteristics. Projects that are designed to promote substantial improvement toward meeting the Wyoming Standards for Healthy Rangelands and sufficiently mitigate impacts to other resource values, if any, will receive a higher priority consideration. Similarly, projects that are designed to promote substantial improvement toward meeting the Wyoming Standards for Healthy Rangelands, and are initiated to enhance other resource values (e.g., wildlife, recreation etc.) will receive a higher priority consideration. Figure K.1, "Range Infrastructure Development" (p. 1582), identifies the process by which the Lander Field Office will prioritize range improvement project proposals.

- Category "M" and "C" allotments will be evaluated for comprehensive grazing management strategies on a case-by-case basis. Where alternative grazing strategies and/or range improvement projects are proposed, the proposals will be evaluated for conflicts with other resources and the potential impacts to the Wyoming Standards for Healthy Rangelands. Projects that are designed to promote enhanced rangeland health and are initiated to enhance other resource values (e.g., wildlife, recreation) will receive a higher priority consideration.
- Monitoring programs will be incorporated into comprehensive grazing management strategies to evaluate the success of new management strategies in meeting resource objectives. The cooperative monitoring program is intended to provide a framework for the facts and data to be collected, analyzed, and shared with the public, and used by the BLM to make land management decisions. A cooperative monitoring effort with the active participation of the grazing permittees and interested public will be encouraged.

The following methods were used to calculate the disturbance areas associated with construction of range improvement projects.

**Spring Developments**

A. (a+b+c) ÷ d = area affected by development = **1.0 acre**

where a = 40,000 square feet; 200 feet by 200 feet area fenced around the spring to prevent damage from livestock,
b = 1,200 square feet; 60 feet of pipeline with a 20 foot width of disturbance for installation with a backhoe,
c = 28 square feet area displaced by a trough 2 feet in width by 14 feet in length, and
d = 43,560 square feet, the number of square feet in one acre.

B. $\pi r^2 \div d$ = acres disturbed by livestock concentration = **1.6 acres**

where $\pi$ = 3.14 and,
$r^2$= 50 yards (150 feet), the radius of the livestock concentration area and
d = 43,560 square feet, the number of square feet in one acre.

C. Total affected area for the spring development would be 1.0 acre + 1.6 acres = **2.6 acres.**

**Water Well Developments**

A. (a+b+2c+d) ÷ e = area affected by development = **0.2 acre**

where a = 5,000 square feet; affected area by well and storage tank,
b = 28 square feet; a water trough 2 feet in width by 14 feet in length,
c = 1,000 square feet; 50 feet of pipeline with a 20 foot width of disturbance for installation with a backhoe,
d = 2,500 square feet; 50 feet by 50 feet affected area of an overflow pond, and
e = 43,560 square feet, number of square feet in one acre.

B. $\pi r^2$ ÷ d = acres disturbed by livestock concentration = **1.6 acres**

where $\pi$ = 3.14, and
$r^2$= 50 yards (150 feet), the radius of the livestock concentration area and
d = 43,560 square feet, the number of square feet in 1 acre.

C. Total acres affected by a water well development would be 0.2 acres + 1.6 acres = **1.8 acres**.

**Fencing**

BLM three-wire cattle fence and riparian-wetlands pasture fence.

axb÷c = total affected area = **1.5 acres/mile**

where a = 12 feet, this includes a two-tracked trail, produced by motor vehicles, on each side of the fence,
b = 5,280 feet, the number of feet in 1 mile, and
c = 43,560 square feet, the number of square feet per acre.

12 feet/mile x 5,280 feet/mile = 63,360 square feet/mile ÷ 43,560 square feet/acre = 1.45 acres/mile

**Pasture Boundary Signs**

Assumed to be 5 percent of the total affected area, the BLM three-wire cattle fence requires repeated travel along the previously constructed fence, therefore causing additional disturbances. Construction of a pasture boundary fence would require a single trip, therefore causing a minimal amount of disturbance.

**Cattleguards**

All proposed cattleguards would be constructed on an existing road; therefore, no additional disturbance would take place.

**Artesian Well (Wetland Fencing)**

A. (600 feet x 6 feet = 3,600 square feet) + (600 feet x 12 feet = 7,200 square feet) = 10,800 square feet ÷ 43,560 square feet/acre = **0.2 acres** on fenceline.

B. 200 feet x 200 feet = 40,000 square feet ÷ 43,560 square feet/acre = **0.9 acres** inside permanent exclosure.

**Pipelines**

1 foot x 5,280 feet/mile = 5,280 square feet/mile ÷ 43,560 square feet/acre = **0.1 acre/mile**

## Table K.1. Grazing Allotments, Acres, Season of Use, and Animal Unit Months

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 180 | Lost Creek | 238 | Permit – Sec 3 | Cattle | 6/15 – 9/25 | 21 |
| 655 | Copper Mountain | 248 | Permit – Sec 3 | Cattle | 6/1 – 11/15 | 121 |
| 1301 | Cantril Jack Allotment | 6,875 | Permit – Sec 3 | Cattle | 8/16 – 11/30 | 573 |
| 1302 | North of CB&Q Railroad | 961 | Permit – Sec 3 | Cattle | 3/5 – 5/4 | 160 |
| 1303 | South of CB&Q Railroad | 7,256 | Permit – Sec 3 | Cattle | 3/5 – 5/4 | 660 |
| | | | | Cattle | 10/20 – 12/16 | |
| | | | | Cattle | 11/15 – 12/16 | |
| 1304 | Crawford Creek | 1,209 | Permit – Sec 3 | Cattle | 6/15 – 10/14 | 460 |
| 1305 | Lybyer North | 3,175 | Permit – Sec 3 | Cattle | 4/26 – 5/31 | 262 |
| 1306 | Canning Allotment | 347 | Permit – Sec 3 | Cattle | 8/10 – 2/28 | 28 |
| | | | | Cattle | 3/1 – 5/1 | |
| | | | | Horse | 3/1 – 2/28 | |
| 1307 | Mallet-Smith Pasture | 137 | Permit – Sec 3 | Cattle | 7/1 – 9/30 | 24 |
| 1308 | 167A Scott-Robson | 283 | Permit – Sec 3 | Cattle | 5/1 – 6/15 | 33 |
| | | | | Cattle | 10/15 – 12/17 | |
| | | | | Sheep | 5/1 – 6/15 | |
| | | | | Sheep | 10/15 – 12/17 | |
| 1309 | Logan Pasture | 3,427 | Permit – Sec 3 | Cattle | 6/1 – 9/15 | 610 |
| 1310 | Cottonwood Pass | 2,321 | Permit – Sec 3 | Cattle | 10/18 – 11/1 | 249 |
| | | | | Cattle | 6/1 – 6/15 | |
| 1311 | Keenan | 191 | Permit – Sec 3 | Cattle | 4/30 – 5/30 | 16 |
| 1312 | North of Tracks | 15,556 | Permit – Sec 3 | Cattle | 2/14 – 6/15 | 2,820 |
| | | | | Cattle | 10/1 – 12/31 | |
| | | | | Horse | 3/1 – 2/28 | |
| 1313 | South of Tracks | 8,923 | Permit – Sec 3 | Cattle | 4/1 – 12/31 | 1,110 |
| 1314 | Moneta Hills Pasture | 7,752 | Permit – Sec 3 | Cattle | 4/1 – 12/31 | 587 |
| 1315 | Ditch Pasture | 782 | Permit – Sec 3 | Cattle | 4/20 – 5/5 | 108 |
| 1316 | Madden Ranch Pasture | 1,442 | Permit – Sec 3 | Cattle | 5/5 – 12/30 | 170 |
| 1317 | Brandau Ranch Allotment | 309 | Permit – Sec 3 | Cattle | 8/15 – 12/31 | 167 |
| 1318 | Below the Hill Pasture | 2,793 | Permit – Sec 3 | Cattle | 6/1 – 9/29 | 78 |
| 1319 | Twidale | 200 | Permit – Sec 3 | Cattle | 5/1 – 5/31 | 39 |
| | | | | Cattle | 10/1 – 10/31 | |
| | | | | Horse | 11/1 – 2/28 | |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 1320 | St. Clair West | 350 | Permit – Sec 3 | Cattle | 4/10 – 5/10 | 65 |
| 1321 | St. Clair Ranch | 141 | Permit – Sec 3 | Cattle | 11/15 – 2/28 | 89 |
| | | | | Cattle | 3/1 – 3/31 | |
| 1322 | St. Clair South Pasture | 4,435 | Permit – Sec 3 | Horse | 5/1 – 1/15 | 726 |
| | | | | Cattle | 10/15 – 12/31 | |
| 1323 | Fuller Allotment | 3,050 | Permit – Sec 3 | Cattle | 8/7 – 10/28 | 413 |
| | | | | Cattle | 5/24 – 6/25 | |
| 1324 | Hoodoo Creek Allotment | 23,168 | Permit – Sec 3 | Cattle | 9/1 – 10/10 | 1,491 |
| | | | | Cattle | 1/6 – 6/26 | |
| 1325 | East of Ranch | 3,033 | Permit – Sec 3 | Cattle | 12/1 – 5/31 | 236 |
| | | | | Sheep | 12/1 – 6/15 | |
| 1326 | Lichtenstein | 5,998 | Permit – Sec 3 | Cattle | 1/1 – 2/28 | 501 |
| | | | | Sheep | 12/1 – 4/15 | |
| 1327 | Myrtle Reed Allotment | 1,213 | Permit – Sec 3 | Cattle | 5/1 – 10/31 | 72 |
| 1328 | Battle Axe South | 6,994 | Permit – Sec 3 | Cattle | 5/1 – 9/12 | 552 |
| 1329 | Lysite Mountain[1] | 8,192 | Permit – Sec 3 | Cattle | 5/10 – 11/1 | 2,569 |
| | | | | Horse | 6/1 – 5/31 | |
| 1330 | Battle Axe Lysite[1] | 3,717 | Permit – Sec 3 | Sheep | 3/19 – 4/20 | 420 |
| | | | | Cattle | 8/15 – 10/1 | |
| | | | | Cattle | 4/15 – 6/1 | |
| 1331 | Battle Axe Berger[1] | 8,537 | Permit – Sec 3 | Cattle | 5/16 – 4/30 | 911 |
| | | | | Horse | 3/1 – 2/28 | |
| 1332 | Bow & Arrow | 1,094 | Permit – Sec 3 | Cattle | 4/10 – 6/15 | 159 |
| | | | | Cattle | 10/1 – 12/1 | |
| | | | | Horse | 6/1 – 9/30 | |
| 1333 | Gates Draw Allotment | 12,793 | Permit – Sec 3 | Cattle | 11/1 – 5/31 | 1,490 |
| 1334 | Cottonwood Pass | 3,890 | Permit – Sec 3 | Cattle | 6/11 – 10/20 | 825 |
| 1335 | OCLA South of Railroad | 6,848 | Permit – Sec 3 | Cattle | 12/1 – 3/31 | 912 |
| 1336 | OCLA North of Railroad | 5,600 | Permit – Sec 3 | Cattle | 4/20 – 5/30 | 425 |
| 1337 | De Pass Ranch | 528 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 125 |
| 1338 | Fuller Ranch Pasture | 1,450 | Permit – Sec 3 | Cattle | 3/1 – 4/30 | 165 |
| 1339 | Picard Private Allotment | 3,146 | Permit – Sec 3 | Cattle | 12/1 – 5/15 | 490 |
| 1340 | 168A North of Seeps | 796 | Permit – Sec 3 | Cattle | 9/20 – 12/1 | 200 |
| | | | | Cattle | 5/1 – 6/1 | |
| | | | | Horse | 6/1 – 9/30 | |
| 1341 | 168 A Stock Driveway[1] | 2,016 | Permit – Sec 3 | Cattle | 12/1 Permit – Sec 312/31 | 40 |
| | | | | Horse | 12/1 – 12/31 | |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 1342 | Knapp Individual | 997 | Permit – Sec 3 | Cattle | 10/10 – 11/15 | 40 |
| 1343 | Tuff Creek Pasture | 15,728 | Permit – Sec 3 | Cattle | 11/16 – 2/28 | 860 |
| | | | | Cattle | 4/1 – 7/31 | |
| 1344 | Westfall | 3,620 | Permit – Sec 3 | Horse | 3/1 – 12/20 | 698 |
| | | | | Cattle | 6/1 – 2/28 | |
| 1345 | Mountain Pasture | 1,135 | Permit – Sec 3 | Cattle | 5/20 – 1/15 | 277 |
| 1346 | Bonneville Reservoir | 10,968 | Permit – Sec 3 | Cattle | 4/15 – 6/10 | 984 |
| | | | | Horse | 4/15 – 6/10 | |
| | | | | Cattle | 10/1 – 12/31 | |
| 1347 | Jones Creek Basin | 1,292 | Permit – Sec 3 | Cattle | 7/1 – 10/10 | 488 |
| 1348 | J. Herbst Summer | 2,198 | Permit – Sec 3 | Cattle | 6/1 – 9/30 | 308 |
| | | | | Horse | 10/1 – 4/30 | |
| 1349 | J. Herbst Tuff Creek | 1,226 | Permit – Sec 3 | Cattle | 10/1 – 11/15 | 228 |
| | | | | Cattle | 5/1 – 5/30 | |
| 1350 | Wm. Herbst Summer | 885 | Permit – Sec 3 | Cattle | 10/15 – 12/15 | 60 |
| 1351 | Scott Draw | 3,386 | Permit – Sec 3 | Cattle | 10/1 – 11/7 | 303 |
| 1352 | Joe Johns Pasture | 1,109 | Permit – Sec 3 | Cattle | 8/15 – 11/30 | 298 |
| | | | | Sheep | 6/1 – 10/1 | |
| 1353 | Campbell | 2,843 | Permit – Sec 3 | Cattle | 5/13 – 11/30 | 299 |
| | | | | Horse | 4/15 – 1/1 | |
| | | | | Sheep | 5/15 – 7/15 | |
| | | | | Sheep | 9/1 – 12/10 | |
| 1354 | Stinking Well | 10,009 | Permit – Sec 3 | Sheep | 3/1 – 4/15 | 789 |
| | | | | Sheep | 5/15 – 6/15 | |
| | | | | Cattle | 3/1 – 5/31 | |
| | | | | Cattle | 12/1 – 2/28 | |
| | | | | Sheep | 12/1 – 2/28 | |
| 1355 | Lookout Hill | 7,942 | Permit – Sec 3 | Sheep | 4/1 – 6/28 | 682 |
| | | | | Sheep | 10/20 – 12/10 | |
| | | | | Cattle | 4/1 – 5/15 | |
| 1356 | Howard Pasture | 2,717 | Permit – Sec 3 | Cattle | 1/1 – 2/28 | 224 |
| | | | | Sheep | 4/1 – 7/31 | |
| | | | | Sheep | 12/15 – 2/28 | |
| 1357 | Summer Allotment | 182 | Permit – Sec 3 | Cattle | 6/15 – 7/14 | 32 |
| 1358 | Top of Mountain Past | 910 | Permit – Sec 3 | Cattle | 6/15 – 10/15 | 23 |
| 1359 | Ramage Ranch | 11,990 | Permit – Sec 3 | Horse | 3/1 – 2/28 | 1,549 |
| | | | | Cattle | 11/1 – 6/20 | |
| 1360 | Ruth Fuller Private | 86 | Permit – Sec 3 | Cattle | 5/15 – 5/23 | 9 |
| | | | | Cattle | 6/26 – 8/6 | |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 1361 | Copper Mountain (Lander) | 288 | Permit – Sec 3 | Cattle | 7/1 – 9/30 | 40 |
| 1362 | Lybyer South | 2,500 | Permit – Sec 3 | Cattle | 3/1 – 4/30 | 319 |
| | | | | Cattle | 10/15 – 11/30 | |
| 1363 | Hoodoo HQ Pastures | 86 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 4 |
| | | | | Horse | 3/1 – 2/28 | |
| 1364 | Red Ranch Pasture | 24 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 1 |
| 1365 | Quien Sabe Ranch Pasture | 5,973 | Permit – Sec 3 | Cattle | 4/1 – 6/30 | 944 |
| | | | | Cattle | 10/1 – 11/15 | |
| 1366 | Cabin Pasture | 265 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 65 |
| | | | | Horse | 5/1 – 11/30 | |
| | | | | Sheep | 3/1 – 2/28 | |
| 1367 | Henrich Pasture | 81 | Permit – Sec 3 | Cattle | 5/15 – 11/1 | 11 |
| 1368 | Bridger Creek | 114 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 18 |
| | | | | Horse | 3/1 – 2/28 | |
| 1369 | Picard Ranch HQ | 191 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 17 |
| 1373 | Copper Mountain | 277 | Permit – Sec 3 | Cattle | 6/1 – 10/15 | 16 |
| 1401 | Rim Pasture[1] | 19,100 | Permit – Sec 3 | Cattle | 6/1 – 10/31 | 3,982 |
| | | | | Sheep | 6/1 – 10/8 | |
| 1402 | Delfelder Allotment | 8,938 | Permit – Sec 3 | Cattle | 3/1 – 1/17 | 1,203 |
| 1403 | Conant Creek Common[1] | 49,541 | Permit – Sec 3 | Sheep | 12/16 – 4/15 | 7,987 |
| | | | | Cattle | 5/1 – 11/30 | |
| | | | | Sheep | 5/1 – 6/15 | |
| | | | | Sheep | 10/14 – 11/30 | |
| 1404 | Wm. Herbst Winter | 2,932 | Permit – Sec 3 | Cattle | 4/6 – 6/20 | 398 |
| | | | | Cattle | 11/1 – 12/31 | |
| 1405 | Posey North Allotment | 4,410 | Permit – Sec 3 | Cattle | 4/15 – 6/20 | 429 |
| | | | | Cattle | 11/1 – 12/15 | |
| 1406 | Poison Creek | 16,759 | Permit – Sec 3 | Cattle | 3/15 – 6/15 | 817 |
| | | | | Cattle | 10/15 – 12/30 | |
| 1407 | Muskrat AMP | 39,494 | Permit – Sec 3 | Cattle | 10/15 – 4/30 | 3,962 |
| 1408 | Township Pasture | 18,904 | Permit – Sec 3 | Cattle | 10/1 – 1/15 | 2,478 |
| | | | | Horse | 11/1 – 2/28 | |
| | | | | Horse | 3/1 – 4/30 | |
| | | | | Cattle | 4/1 – 4/30 | |
| 1409 | Muskrat Open[1] | 99,243 | Permit – Sec 3 | Cattle | 5/1 – 11/30 | 10,519 |
| 1410 | Posey Pasture | 1,061 | Permit – Sec 3 | Cattle | 4/22 – 5/20 | 165 |
| 1411 | Shoshoni Road | 21,158 | Permit – Sec 3 | Cattle | 3/1 – 1/17 | 2,706 |
| | | | | Horse | 3/1 – 2/28 | |
| 1412 | Poston Winter | 3,552 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 437 |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 1413 | Pipeline Pasture | 4,228 | Permit – Sec 3 | Horse | 12/1 – 4/30 | 452 |
| | | | | Cattle | 12/1 – 5/4 | |
| 1414 | Anderson Winter | 5,864 | Permit – Sec 3 | Cattle | 11/1 – 1/2 | 770 |
| | | | | Cattle | 5/15 – 5/31 | |
| 1415 | Myers Pasture | 903 | Permit – Sec 3 | Cattle | 5/1 – 9/15 | 116 |
| 1416 | Lame Jack Draw | 6,373 | Permit – Sec 3 | Cattle | 5/1 – 9/30 | 720 |
| 1417 | Haybarn Hill | 9,947 | Permit – Sec 3 | Cattle | 11/1 – 4/30 | 1,195 |
| 1512 | South Dobie Flat | 6,847 | Permit – Sec 3 | Cattle | 5/23 – 6/9 | 1,207 |
| | | | | Cattle | 10/25 – 12/6 | |
| 1518 | Little Bug Pasture | 3,837 | Permit – Sec 3 | Cattle | 1/1 – 4/1 | 564 |
| 1601 | Dodds Allotment | 1,744 | Permit – Sec 3 | Sheep | 5/1 – 10/30 | 446 |
| 1604 | #17 Horse Heaven Pasture | 16,329 | Permit – Sec 3 | Horse | 6/1 – 9/30 | 3,077 |
| | | | | Cattle | 6/15 – 10/19 | |
| | | | | Sheep | 7/1 – 10/18 | |
| 1605 | #18 Horse Creek Pasture | 3,685 | Permit – Sec 3 | Sheep | 5/1 – 6/15 | 459 |
| | | | | Sheep | 10/19 – 11/30 | |
| | | | | Cattle | 10/20 – 11/16 | |
| 1606 | #19 Vinegar Hill Pasture | 6,662 | Permit – Sec 3 | Sheep | 10/19 – 12/12 | 981 |
| | | | | Horse | 1/1 – 3/31 | |
| | | | | Cattle | 11/18 – 12/24 | |
| | | | | Sheep | 12/30 – 1/15 | |
| 1607 | #16 Phillips Pasture | 1,872.00 | Permit – Sec 3 | Sheep | 1/16 – 4/15 | 259 |
| | | | | Cattle | 12/25 – 2/8 | |
| 1608 | #20 Calf Pasture | 828 | Permit – Sec 3 | Cattle | 5/1 – 6/15 | 130 |
| | | | | Sheep | 5/1 – 6/15 | |
| 1609 | #21 Horse Pasture | 1,143 | Permit – Sec 3 | Horse | 4/1 – 5/31 | 168 |
| | | | | Cattle | 6/1 – 6/6 | |
| | | | Permit – Sec 3 | Sheep | 6/16 – 6/30 | |
| 1610 | #22 Bull Pasture | 908 | Permit – Sec 3 | Cattle | 4/1 – 6/30 | 156 |
| | | | | Sheep | 5/1 – 6/15 | |
| 1612 | Hamilton Rock Pasture | 3,998 | Permit – Sec 3 | Cattle | 12/25 – 1/27 | 454 |
| | | | | Sheep | 1/16 – 4/15 | |
| 1614 | Circle Bar Allotment | 38,299 | Permit – Sec 3 | Horse | 5/1 – 2/28 | 5,897 |
| | | | | Cattle | 5/1 – 2/28 | |
| 1615 | North of Drift Fence | 20,318 | Permit – Sec 3 | Cattle | 6/10 – 9/26 | 4,391 |
| 1616 | Keester | 29,779 | | Horse | 11/15 – 12/5 | 4,582 |
| | | | Permit – Sec 3 | Cattle | 5/16 – 11/28 | |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 1619 | Winter Pastures (incl. Clayto 1618) | 17,569 | Permit – Sec 3 | Cattle | 9/26 – 5/15 | 2,635 |
| | | | | Horse | 12/6 – 6/30 | |
| 1620 | Cabin Creek Pasture | 1,153 | Permit – Sec 3 | Cattle | 7/10 – 10/26 | 241 |
| 1622 | Hat Ranch | 5,022 | Permit – Sec 3 | Cattle | 3/1 – 5/15 | 855 |
| | | | | Horse | 3/1 – 5/15 | |
| | | | | Cattle | 12/1 – 2/28 | |
| | | | | Horse | 11/1 – 2/28 | |
| 1623 | Murphree Pastures | 9,219 | Permit – Sec 3 | Horse | 6/25 – 11/16 | 1,061 |
| | | | | Cattle | 3/1 – 11/30 | |
| 1625 | Jamerman Pastures | 6,603 | Permit – Sec 3 | Cattle | 3/1 – 5/19 | 478 |
| | | | | Cattle | 11/1 – 2/28 | |
| 1626 | Mud Lake | 1,324 | Permit – Sec 3 | Cattle | 12/1 – 12/31 | 113 |
| 1628 | Sage Hen | 1,312 | Permit – Sec 3 | Cattle | 12/1 – 2/28 | 189 |
| 1629 | JJ Winter Pastures | 721 | Permit – Sec 3 | Cattle | 3/1 – 4/30 | 276 |
| | | | | Horse | 3/1 – 2/28 | |
| | | | | Cattle | 11/1 – 2/28 | |
| 1630 | Tram Road Pasture | 1,136 | Permit – Sec 3 | Cattle | 4/1 – 5/15 | 135 |
| 1631 | Claytor Homestead | 59 | Permit – Sec 3 | Cattle | 3/1 – 3/31 | 6 |
| 1632 | North Hat Pasture | 1,144 | Permit – Sec 3 | Cattle | 3/15 – 4/30 | 180 |
| | | | | Horse | 6/1 – 8/31 | |
| 1633 | Stampede Bog | 552 | Permit – Sec 3 | Cattle | 3/1 – 4/30 | 89 |
| | | | | Cattle | 10/15 – 11/30 | |
| 1635 | Big Rock Pasture | 13,386 | Permit – Sec 3 | Cattle | 4/1 – 5/31 | 1,995 |
| | | | | Cattle | 10/15 – 11/26 | |
| 1636 | Granite Mtn. Open[1] | 77,746 | Permit – Sec 3 | Cattle | 5/10 – 10/31 | 12,584 |
| 1638 | Winter Allotment | 160 | Permit – Sec 3 | Cattle | 3/1 – 3/31 | 16 |
| 1640 | Garson Ranch | 2,531 | Lease – Sec 15 | Cattle | 6/1 – 10/31 | 403 |
| 1642 | Devils Gate | 24,227 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 3,700 |
| | | | | Horse | | |
| 1644 | Turkey Track Ranch | 9,057 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 1,832 |
| | | | | Horse | | |
| 1660 | Home, North of Highway | 1,231 | Permit – Sec 3 | Cattle | 12/1 – 5/25 | 205 |
| | | | | Horse | 3/1 – 5/25 | |
| 1701 | Flagg AMP[1] | 11,463 | Permit – Sec 3 | Cattle | 5/1 – 11/30 | 2,086 |
| 1702 | Flagg Individual | 298 | Permit – Sec 3 | Cattle | 12/1 – 2/28 | 51 |
| 1703 | Big Pasture[1] | 76,090 | Permit – Sec 3 | Cattle | 5/1 – 11/7 | 11,909 |
| 1704 | Breeding Pasture[1] | 16,916 | Permit – Sec 3 | Cattle | 4/3 – 6/8 | 1,956 |
| | | | | Cattle | 9/1 – 11/16 | |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| | | | | Horse | 4/1 – 12/15 | |
| 1705 | Myers Fenced Pasture | 1,640 | Permit – Sec 3 | Cattle | 4/6 – 4/30 | 175 |
| 1706 | Trent and Home Place | 427 | Permit – Sec 3 | Cattle | 11/16 – 2/28 | 40 |
| 1707 | Ice Slough | 953 | Permit – Sec 3 | Cattle | 5/1 – 7/31 | 183 |
| 1709 | Long Creek Pasture | 2,567 | Permit – Sec 3 | Cattle | 4/1 – 9/30 | 227 |
| | | | | Cattle | 11/16 – 12/15 | |
| 1710 | Graham Ranch Pasture | 1,129 | Permit – Sec 3 | Cattle | 11/15 – 2/28 | 175 |
| | | | | Cattle | 3/1 – 4/30 | |
| 1711 | Hay Meadow Pasture | 316 | Permit – Sec 3 | Cattle | 3/1 – 5/14 | 50 |
| | | | | Cattle | 9/1 – 2/28 | |
| 1712 | Long Creek Sweetwater | 426 | Permit – Sec 3 | Cattle | 11/1 – 4/30 | 66 |
| 1713 | Whitlock Fenced | 1,057 | Permit – Sec 3 | Cattle | 4/1 – 4/30 | 126 |
| 1714 | Scarlett Pasture | 41 | Permit – Sec 3 | Cattle | 10/1 – 2/28 | 79 |
| 1715 | Horse Pasture | 130 | Permit – Sec 3 | Horse | 3/1 – 3/31 | 14 |
| | | | | Horse | 12/16 – 2/28 | |
| 1716 | Dishpan Butte[1] | 16,069 | Permit – Sec 3 | Cattle | 5/15 – 11/1 | 1,983 |
| 1717 | Fenced Individual | 1,310 | Permit – Sec 3 | Cattle | 5/1 – 6/14 | 171 |
| 1801 | East Beaver Common[1] | 61,911 | Permit – Sec 3 | Cattle | 5/1 – 11/15 | 7,331 |
| 1802 | Sand Draw AMP | 13,635 | Permit – Sec 3 | Cattle | 6/1 – 10/15 | 1,418 |
| 1803 | Government Draw[1] | 75,775 | Permit – Sec 3 | Cattle | 5/7 – 10/31 | 8,940 |
| 1804 | Government Draw-Lower Beaver[1] | 20,468 | Permit – Sec 3 | Cattle | 3/1 – 6/10 | 4,040 |
| | | | | Cattle | 11/1 – 2/28 | |
| 1805 | Kirby-Reservation Boundary | 5,265 | Permit – Sec 3 | Cattle | 5/16 – 6/14 | 734 |
| | | | | Cattle | 11/1 – 11/30 | |
| 1806 | Griffin Beaver Creek | 6,087 | Permit – Sec 3 | Cattle | 5/1 – 10/15 | 714 |
| 1807 | Baldwin Pasture | 465 | Permit – Sec 3 | Cattle | 4/20 – 5/15 | 105 |
| 1808 | Hudson Draw Private Allotment | 481 | Permit – Sec 3 | Cattle | 5/7 – 6/14 | 38 |
| 1809 | Bringolf Ranch | 668 | Permit – Sec 3 | Cattle | 4/15 – 5/14 | 141 |
| | | | | Cattle | 10/1 – 10/31 | |
| 1810 | Yellowstone Ranch | 338 | Permit – Sec 3 | Cattle | 11/1 – 12/31 | 92 |
| 1813 | Blue Ridge | 260 | Permit – Sec 3 | Cattle | 11/1 – 12/16 | 8 |
| 1814 | Highway Pasture | 152 | Permit – Sec 3 | Cattle | 5/1 – 5/29 | 21 |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 1901 | Atlantic City Common[1] | 38,698 | Permit – Sec 3 | Cattle | 5/20 – 9/30 | 4,765 |
| | | | | Cattle | 5/8 – 10/4 | |
| | | | | Goat | 5/20 – 9/30 | |
| 1902 | Cottonwood Basin | 7,625 | Permit – Sec 3 | Horse | 5/1 – 9/30 | 705 |
| | | | | Cattle | 4/20 – 10/31 | |
| 1903 | Silver Creek Common[1] | 32,941 | Permit – Sec 3 | Cattle | 5/15 – 10/31 | 3,524 |
| 1904 | Devils Canyon AMP[1] | 3,585 | Permit – Sec 3 | Cattle | 5/16 – 9/30 | 652 |
| 1905 | Ellis Upper Beaver[1] | 2,105 | Permit – Sec 3 | Cattle | 5/16 – 9/30 | 530 |
| 1906 | Twin Creek Individual | 7,516 | Permit – Sec 3 | Cattle | 5/1 – 12/1 | 1,644 |
| | | | | Horse | 5/2 – 7/1 | |
| 1907 | Commissary Hill | 953 | Permit – Sec 3 | Cattle | 6/1 – 6/15 | 74 |
| | | | | Cattle | 10/1 – 10/15 | |
| 1908 | Little Popo Agie AMP | 8,541 | Permit – Sec 3 | Cattle | 5/10 – 10/1 | 1,814 |
| 1909 | Onion Flat | 1,193 | Permit – Sec 3 | Cattle | 5/1 – 5/31 | 188 |
| | | | | Cattle | 10/16 – 11/15 | |
| 1910 | Sawmill Basin | 2,401 | Permit – Sec 3 | Cattle | 6/1 – 10/15 | 197 |
| 1911 | Red Canyon AMP[1] | 3,605 | Permit – Sec 3 | Cattle | 5/15 – 8/28 | 580 |
| 1912 | Twin Creek Private | 385 | Permit – Sec 3 | Cattle | 5/16 – 10/15 | 44 |
| 1913 | McGraw Flat Individual | 1,034 | Permit – Sec 3 | Cattle | 6/1 – 9/30 | 206 |
| 1914 | McGraw Flat Common[1] | 10,401 | Permit – Sec 3 | Cattle | 5/1 – 10/31 | 1,824 |
| 1915 | Beaver AMP | 8,958 | Permit – Sec 3 | Cattle | 5/1 – 10/31 | 1,964 |
| 1916 | Hall CK Individual | 12,464 | Permit – Sec 3 | Cattle | 5/1 – 1/31 | 2,328 |
| | | | | Horse | 5/15 – 2/28 | |
| 1917 | Cottonwood Divide | 5,685 | Permit – Sec 3 | Cattle | 6/1 – 7/10 | 1,570 |
| | | | | Cattle | 10/1 – 11/14 | |
| 1918 | McGraw Flat-U. Beaver | 8,388 | Permit – Sec 3 | Cattle | 7/1 – 10/10 | 1,146 |
| 1919 | Gravel Springs[1] | 2,840 | Permit – Sec 3 | Cattle | 5/16 – 10/10 | 488 |
| 1920 | Salisbury AMP | 5,389 | Permit – Sec 3 | Cattle | 5/16 – 9/30 | 996 |
| | | | | Horse | 5/16 – 9/30 | |
| 1921 | Level Meadows | 3,249 | Permit – Sec 3 | Cattle | 6/1 – 10/30 | 701 |
| 1922 | French George Crossing | 626 | Permit – Sec 3 | Cattle | 5/16 – 9/30 | 146 |
| 1923 | Atlantic City Upper Fenced | 248 | Permit – Sec 3 | Cattle | 5/1 – 11/30 | 81 |
| 1924 | Atlantic City Lower Fenced | 127 | Permit – Sec 3 | Cattle | 5/1 – 11/30 | 58 |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 1925 | Hall Creek Winter Pasture[1] | 1,299 | Permit – Sec 3 | Cattle | 11/23 – 2/28 | 98 |
| 1926 | McKinney Individual | 818 | Permit – Sec 3 | Cattle | 5/1 – 9/30 | 235 |
| 1927 | Upper Ellis Ranch | 236 | Permit – Sec 3 | Cattle | 9/15 – 12/31 | 157 |
| 1928 | Lower Ellis Ranch | 321 | Permit – Sec 3 | Cattle | 9/15 – 12/31 | 48 |
| 1929 | Barras Spring | 51 | Not Licensed | | | |
| 1930 | Long Willow | 709 | Not Licensed | | | |
| 1931 | Woolery Individual | 1,231 | Not Licensed | | | |
| 1932 | Sheep Mountain | 558 | Permit – Sec 3 | Cattle | 6/1 – 9/30 | 99 |
| 1933 | Lazy Y | 173 | Not Licensed | | | |
| 1934 | Red Canyon Rim | 846 | Permit – Sec 3 | Cattle | 6/5 – 10/31 | 29 |
| 1935 | Bowman Ranch | | Not Licensed | | | |
| 1936 | Derby | | Not Licensed | | | |
| 1937 | Little Knoll | | Not Licensed | | | |
| 1938 | Bergstedt Ranch | 52 | Not Licensed | | | |
| 1939 | Auer Ranch | 649 | Permit – Sec 3 | Cattle | 11/1 – 2/28 | 93 |
| 1940 | Henton Ranch | 24 | Not Licensed | | | |
| 1941 | Flat Onion | | Not Licensed | | | |
| 1943 | Red Bluff Creek | 89 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 1 |
| | | | | Cattle | 6/1 – 9/30 | |
| 2009 | Alkali Pasture | 444 | Permit – Sec 3 | Cattle | 5/1 – 6/30 | 28 |
| | | | | Cattle | 8/1 – 10/31 | |
| 2011 | Highway Allotment | 509 | Permit – Sec 3 | Cattle | 4/1 – 5/15 | 90 |
| 2021 | Willow Creek Allotment | 85 | Permit – Sec 3 | Cattle | 5/1 – 6/30 | 15 |
| 2023 | Crooks Gap | 952 | Permit – Sec 3 | Cattle | 10/1 – 11/30 | 83 |
| 2025 | Leckinby Pasture | 3,436 | Permit – Sec 3 | Cattle | 5/1 – 11/30 | 607 |
| 2026 | Little Camp Creek | 2,281 | Permit – Sec 3 | Cattle | 5/1 – 10/31 | 294 |
| 2028 | Mitchell Pasture | 544 | Permit – Sec 3 | Cattle | 6/15 – 9/15 | 106 |
| 2029 | Diamond Hook | 141 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 27 |
| 2103 | Lime Kiln Gulch | 1,159 | Lease – Sec 15 | Cattle | 5/15 – 6/30 | 154 |
| 2104 | Little Warm Springs Canyon | 315 | Not Licensed | Cattle | 9/25 – 9/28 | 27 |
| 2106 | Fire Ridge | 148 | Lease – Sec 15 | Horse | 6/15 – 9/30 | 8 |
| 2107 | Wells 11 | 305 | Lease – Sec 15 | Horse | 5/1 – 6/30 | 31 |
| | | | | Horse | 8/1 – 10/31 | |
| 2108 | Geyser Creek | 829 | Lease – Sec 15 | Horse | 6/1 – 9/30 | 50 |
| 2109 | Cross 14 | 643 | Lease – Sec 15 | Cattle | 6/1 – 9/30 | 134 |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 2110 | Little Horse Creek | 720 | Lease – Sec 15 | Horse | 5/15 – 10/31 | 51 |
| 2111 | E A Mountain 16 | 1,761 | Lease – Sec 15 | Cattle | 6/1 – 6/30 | 264 |
| | | | | Cattle | 8/1 – 10/30 | |
| 2112 | Bear Creek No. 2112 | 3,499 | Lease – Sec 15 | Cattle | 5/1 – 6/30 | 542 |
| | | | | Cattle | 10/15 – 11/30 | |
| 2113 | Crooked Creek | 1,247 | Lease – Sec 15 | Cattle | 6/25 – 9/30 | 133 |
| | | | | Horse | 6/25 – 10/28 | |
| 2114 | Spence 23 | 1,470 | Lease – Sec 15 | Cattle | 5/1 – 12/1 | 290 |
| 2115 | Hat Butte | 893 | Lease – Sec 15 | Cattle | 6/1 – 6/30 | 154 |
| | | | | Cattle | 9/1 – 10/30 | |
| 2116 | Elk Ridge Southeast | 316 | Lease – Sec 15 | Horse | 6/1 – 8/31 | 21 |
| 2117 | Blue Holes | 682 | Lease – Sec 15 | Horse | 3/1 – 4/30 | 90 |
| | | | | Horse | 11/1 – 2/28 | |
| 2119 | White Pass 31 | 650 | Lease – Sec 15 | Cattle | 5/1 – 6/30 | 116 |
| | | | | Cattle | 10/1 – 11/30 | |
| 2120 | Windy Ridge | 332 | Lease – Sec 15 | Cattle | 4/1 – 6/30 | 54 |
| | | | | Cattle | 10/1 – 10/31 | |
| 2121 | Mason Drawn | 6,813 | Lease – Sec 15 | Cattle | 5/1 – 6/30 | 845 |
| | | | | Cattle | 10/1 – 10/30 | |
| 2122 | Tappan Creek 34 | 1,065 | Lease – Sec 15 | Cattle | 6/1 – 11/15 | 180 |
| 2123 | Battrum Mountain | 5,936 | Lease – Sec 15 | Cattle | 6/1 – 10/15 | 531 |
| 2125 | Albright 47 | 286 | Lease – Sec 15 | Horse | 4/1 – 6/30 | 28 |
| | | | | Horse | 10/1 – 10/31 | |
| 2126 | CM 49 | 940 | Lease – Sec 15 | Horse | 11/10 – 12/9 | 67 |
| | | | | Horse | 6/1 – 6/30 | |
| 2127 | Wagon Gulch | 80 | Lease – Sec 15 | Cattle | 6/15 – 12/15 | 95 |
| | | | | Horse | 6/15 – 12/15 | |
| 2128 | Bitterroot 60 | 691 | Lease – Sec 15 | Horse | 5/20 – 6/17 | 68 |
| 2130 | Cross 67 | 591 | Lease – Sec 15 | Cattle | 5/1 – 9/30 | 91 |
| 2132 | Stoney Point 73 | 121 | Lease – Sec 15 | Horse | 3/1 – 6/1 | 12 |
| | | | | Horse | 10/15 – 2/28 | |
| 2201 | North Fork Rim | | Lease – Sec 15 | Cattle | 6/1 – 10/31 | 60 |
| 2202 | Baldwin Creek School | 1,959 | Lease – Sec 15 | Horse | 5/1 – 7/1 | 16 |
| 2203 | Madison Creek | 1,656 | Lease – Sec 15 | Horse | 5/1 – 11/30 | 20 |
| | | 282 | | Cattle | 5/1 – 11/30 | |
| 2204 | Table Mountain 9 | 1,216 | Lease – Sec 15 | Cattle | 6/1 – 10/1 | 128 |
| 2205 | Hopkins 13 | 200 | Lease – Sec 15 | Cattle | 6/1 – 9/30 | 40 |
| | | | | Horse | 6/1 – 9/30 | |
| 2206 | Wickstrom 17 | 179 | Lease – Sec 15 | Cattle | 6/16 – /7/16 | 11 |
| 2207 | Steers 19 | 2,522 | Lease – Sec 15 | Cattle | 6/15 – 9/30 | 146 |
| 2208 | Pine Bar 21 | 418 | Lease – Sec 15 | Cattle | 6/1 – 8/31 | 6 |
| 2210 | Willow Creek 24 | 1,108 | Lease – Sec 15 | Cattle | 5/15 – 10/15 | 274 |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 2211 | Squaw Creek | 1,174 | Lease – Sec 15 | Cattle | 6/1 – 8/31 | 209 |
| 2212 | Frank Ranch 28 | 582 | Lease – Sec 15 | Cattle | 5/1 – 11/1 | 110 |
| 2213 | Spriggs 36 | 2,196 | Lease – Sec 15 | Cattle | 6/15 – 9/29 | 70 |
| 2214 | Meyer Basin | 1,273 | Lease – Sec 15 | Cattle | 6/1 – 9/30 | 233 |
| 2215 | Wunder 38 | 1,284 | Lease – Sec 15 | Cattle | 7/1 – 9/15 | 63 |
| 2216 | Day 39 | 106 | Lease – Sec 15 | Horse | 6/1 – 7/13 | 4 |
| 2217 | Nicholas 40 | 428 | Lease – Sec 15 | Cattle | 6/1 – 9/29 | 48 |
| 2218 | Double A 41 | 280 | Lease – Sec 15 | Cattle | 6/1 – 6/30 | 38 |
| 2219 | Orchard Draw | 964 | Lease – Sec 15 | Cattle | 5/10 – 10/1 | 124 |
| 2220 | Red Butte | 40 | Lease – Sec 15 | Cattle | 6/1 – 10/31 | 5 |
| 2221 | Juniper Hill | 200 | Lease – Sec 15 | Cattle | 10/1 – 11/15 | 15 |
| 2222 | School Allotment | 160 | Lease – Sec 15 | Cattle | 5/1 – 7/2 | 25 |
| 2223 | Baldwin Creek 51 | 200 | Lease – Sec 15 | Cattle | 6/1 – 8/31 | 18 |
| 2224 | Natural Lake | 235 | Lease – Sec 15 | Cattle | 6/1 – 7/27 | 22 |
| 2225 | Crump 53 | 163 | Lease – Sec 15 | Horse | 6/1 – 11/14 | 27 |
| 2226 | Hunter | 79 | Lease – Sec 15 | Cattle | 6/1 – 8/31 | 6 |
| 2227 | Smith Creek | 78 | Lease – Sec 15 | Cattle | 10/1 – 10/7 | 6 |
| 2228 | Spriggs 57 | 120 | Lease – Sec 15 | Horse | 8/1 – 9/30 | 6 |
| 2229 | Kaper 59 | 277 | Lease – Sec 15 | Cattle | 6/1 – 9/30 | 56 |
| 2230 | Table Mountain 61 | 40 | Lease – Sec 15 | Cattle | 6/1 – 9/22 | 7 |
| 2231 | Booth 62 | 121 | Lease – Sec 15 | Cattle | 6/1 – 6/21 | 8 |
| 2232 | Beason Creek 63 | 476 | Lease – Sec 15 | Cattle | 6/1 – 9/30 | 20 |
| 2233 | Batrum Gap | 474 | Lease – Sec 15 | Cattle | 6/1 – 10/30 | 96 |
| | | | | Horse | 12/1 – 12/15 | |
| 2234 | Sjostrom 66 | 168 | Lease – Sec 15 | Horse | 6/1 – 8/31 | 18 |
| 2235 | Horny Toad Associate | 522 | Lease – Sec 15 | Cattle | 6/1 – 10/30 | 35 |
| 2236 | Freeman 70 | 121 | Lease – Sec 15 | Horse | 5/1 – 9/25 | 24 |
| 2237 | North Fork | 473 | Lease – Sec 15 | Cattle | 5/10 – 10/31 | 38 |
| 2238 | Hilltop | 40 | Lease – Sec 15 | Cattle | 3/1 – 6/1 | 7 |
| | | | | Cattle | 11/15 – 2/28 | |
| 2239 | Cyclone Pass | | Not Licensed | | | |
| 2240 | Harvey Basin | 1,475 | Lease – Sec 15 | Cattle | 5/15 – 10/30 | 183 |
| 2520 | Woods Basin | 173 | Lease – Sec 15 | Cattle | 6/20 – 9/30 | 25 |
| 10160 | Cedar Ridge LRA | 520 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 67 |
| 10203 | Cherry Creek | 28,793 | Permit – Sec 3 | Cattle/Horse | 3/1 – 2/28 | 4,841 |
| 10205 | Bar Eleven | 51,065 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 11,419 |
| | | | | Horse | | |
| | | | | Sheep | | |
| 10224 | Stewart Creek[1] | 61,284 | Permit – Sec 3 | Cattle | 5/28 – 8/30 | 149 |
| 10533 | Steamboat Lake | 1,633 | Permit – Sec 3 | Cattle | 3/1 – 2/28 | 261 |
| | | | | Horse | | |
| 11501 | Muskrat-Linn | 54,118 | Permit – Sec 3 | Cattle | 1/1 – 12/31 | 6,799 |
| 11502 | Fraser Draw[1] | 73,110 | Permit – Sec 3 | Cattle | 5/16 – 12/16 | 5,941 |
| 11504 | Canyon Creek | 11,109 | Permit – Sec 3 | Cattle | 5/20 – 10/31 | 1,400 |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 11505 | South Deer Creek | 11,319 | Permit – Sec 3 | Cattle | 5/10 – 10/31 | 1,292 |
| 11506 | Deer Creek AMP | 7,052 | Permit – Sec 3 | Cattle | 5/15 – 11/15 | 1,297 |
| 11507 | South Cross L | 2,360 | Permit – Sec 3 | Cattle | 3/1 – 5/21 | 386 |
| | | | | Horse | 6/1 – 10/12 | |
| 11508 | Gas Hills | 48,496 | Permit – Sec 3 | Cattle | 5/16 – 12/10 | 3,547 |
| | | | | Sheep | 5/16 – 12/10 | |
| 11509 | Diamond Springs | 40,573 | Permit – Sec 3 | Cattle | 6/10 – 11/20 | 4,956 |
| | | | | Horse | 10/23 – 11/20 | |
| 11510 | North Willow Creek | 3,475 | Permit – Sec 3 | Cattle | 4/20 – 6/10 | 616 |
| 11511 | North Dobie Flat | 11,469 | Permit – Sec 3 | Cattle | 5/5 – 6/5 | 1,516 |
| | | | | Cattle | 10/15 – 11/30 | |
| 11513 | Blackjack Ranch | 31,197 | Permit – Sec 3 | Cattle | 6/6 – 9/6 | 1,721 |
| 11514 | Gap Pasture | 3,433 | Permit – Sec 3 | Cattle | 5/1 – 6/2 | 581 |
| 11515 | Cross L Pastures | 1,327 | Permit – Sec 3 | Cattle | 12/16 – 4/30 | 316 |
| | | | | Horse | 5/26 – 6/24 | |
| 11516 | Basin Pasture | 18,286 | Permit – Sec 3 | Cattle | 7/1 – 11/30 | 2,471 |
| 11517 | Bug Meadows Pastures | 568 | Permit – Sec 3 | Cattle | 3/1 – 5/31 | 91 |
| 12002 | Harris Slough Past | 110 | Permit – Sec 3 | Cattle | 4/20 – 5/19 | 5 |
| 12003 | Whiskey Peak Incomm[1] | 63,446 | Permit – Sec 3 | Cattle | 6/1 – 12/30 | 5,254 |
| | | | | Sheep | | |
| 12004 | Green Mountain Fenced | 4,310 | Permit – Sec 3 | Cattle | 4/10 – 5/10 | 652 |
| | | | | Cattle | 10/1 – 11/1 | |
| | | | | Horse | 8/1 – 9/30 | |
| 12005 | Home, South of Highway | 2,715 | Permit – Sec 3 | Cattle | 12/16 – 3/5 | 383 |
| 12006 | 46 Pasture[1] | 2,683 | Permit – Sec 3 | Cattle | 3/1 – 6/15 | 488 |
| | | | | Cattle | 10/1 – 2/28 | |
| 12007 | Rigby Pasture | 1,091 | Permit – Sec 3 | Cattle | 6/1 – 10/31 | 176 |
| 12012 | East Allotment | 2,002 | Permit – Sec 3 | Cattle | 10/16 – 11/7 | 377 |
| | | | | Cattle | 4/16 – 5/15 | |
| 12013 | Fenced Allotment | 10,329 | Permit – Sec 3 | Cattle | 5/16 – 10/31 | 1,703 |
| 12014 | South Hat Pasture | 1,789 | Permit – Sec 3 | Cattle | 4/15 – 6/13 | 287 |
| 12015 | Hadsell Pasture | 3,806 | Permit – Sec 3 | Cattle | 5/10 – 10/16 | 547 |
| 12016 | State-71 Meadows | 274 | Permit – Sec 3 | Cattle | 5/1 – 5/31 | 51 |
| 12018 | Alma Grieve Pasture | 3,271 | Permit – Sec 3 | Cattle | 10/1 – 2/28 | 453 |
| 12019 | Cooper Creek | 1,247 | Permit – Sec 3 | Cattle | 6/1 – 7/15 | 200 |
| | | | | Cattle | 10/1 – 12/30 | |

| Allotment Number | Allotment Name | Public Acres | Permit/Lease | Livestock Kind | Season of Use | Public AUMs |
|---|---|---|---|---|---|---|
| 12020 | Cottonwood Pasture | 2,019 | Permit – Sec 3 | Cattle | 11/1 – 2/28 | 265 |
| 12242 | Squaw Creek | 80 | Lease – Sec 15 | Cattle | 10/1 – 11/14 | 13 |
| 14289 | Upper Poison Spider Creek | 9,065 | Permit – Sec 3 | Cattle | | 1,693 |
| | | | | Sheep | | |
| 14808 | Three Crossings Allotment | 1,514 | Permit – Sec 3 | Cattle | 5/1 – 10/11 | 602 |
| | | | | Cattle | 11/10 – 11/30 | |
| 20213 | Elkhorn LRA (including Oil City Allotment 1602) | 305 | Permit – Sec 3 | Cattle | 5/20 – 6/8 | 791 |
| | | | | Horse | 5/15 – 6/14 | |
| | | | | Cattle | 7/15 – 10/15 | |
| 21519 | Miller Springs Pasture | 1,884 | Permit – Sec 3 | Cattle | 6/1 – 9/30 | 313 |
| 21520 | School Pasture | 874 | Permit – Sec 3 | Cattle | 9/1 – 11/30 | 251 |
| 21521 | Riddle Pasture | 1,350 | Permit – Sec 3 | Cattle | 4/1 – 5/31 | 306 |
| | | | | Cattle | 11/1 – 12/31 | |
| 21522 | Decker Pasture | 331 | Permit – Sec 3 | Cattle | 4/1 – 5/31 | 49 |
| | | | | Cattle | 11/1 – 12/31 | |
| 21523 | Hay Meadow Pastures | 69 | Permit – Sec 3 | Cattle | 12/1 – 4/30 | 168 |
| 31519 | Beef Gap Pasture | 352 | Permit – Sec 3 | Cattle | 5/1 – 6/2 | 72 |
| 32001 | Green Mountain CMN[1] | 466,474 | Permit – Sec 3 | Sheep | 3/1 – 2/28 | 11,450 |
| | | | | Cattle | 5/1 – 12/31 | 35,911 |

Note: Data in table derived from Bureau of Land Management Lander Field Office internal databases.
[1] Indicates a common allotment.

AMP Allotment Management Plan
AUM Animal Unit Month

## Table K.2. Allotment Categorization – Current and Proposed

| Allotment | Allotment Name | Existing RMP | Proposed New Category |
|---|---|---|---|
| 01323 | Fuller Allotment | I | I |
| 180 | Lost Creek | M | M |
| 00655 | Copper Mountain | I | I |
| 01301 | Cantril Jack Allotment | M | M |
| 01302 | North of CB&Q Railroad | C | I |
| 01303 | South of CB&Q Railroad | M | I |
| 01304 | Crawford Creek | I | I |
| 01305 | Lybyer North | I | I |
| 01306 | Canning Allotment | M | M |
| 01307 | Mallet-Smith Pasture | C | C |
| 01308 | 167A Scott Robson | M | M |
| 01309 | Logan Pasture | M | M |
| 01310 | Cottonwood Pass | C | I |
| 01311 | Keenan | C | C |

| Allotment | Allotment Name | Existing RMP | Proposed New Category |
|---|---|---|---|
| 01312 | North of Tracks | M | I |
| 01313 | South of Tracks | I | I |
| 01314 | Moneta Hills Pasture | M | M |
| 01315 | Ditch Pasture | C | C |
| 01316 | Madden Ranch Pasture | C | C |
| 01317 | Brandau Ranch Allotment | C | I |
| 01318 | Below the Hill Pasture | M | M |
| 01319 | Twidale | C | C |
| 01320 | St. Clair West | C | I |
| 01321 | St. Clair Ranch | C | C |
| 01322 | St. Clair South Past. | I | I |
| 01324 | Hoodoo Creek Allotment | I | I |
| 01325 | East of Ranch | I | I |
| 01326 | Lichtenstein | I | I |
| 01327 | Myrtle Reed Allotment | I | I |
| 01328 | Battle Axe South | M | M |
| 01329 | Lysite Mountain | I | I |
| 01330 | Battle Axe Lysite | M | M |
| 01331 | Battle Axe Berger | M | I |
| 01332 | Bow & Arrow | M | M |
| 01333 | Gates Draw Allotment | I | I |
| 01334 | Cottonwood Pass | I | I |
| 01335 | OCLA South of Railroad | I | I |
| 01336 | OCLA North of Railroad | I | I |
| 01337 | De Pass Ranch | C | C |
| 01338 | Fuller Ranch Pasture | I | I |
| 01339 | Picard Private Allotment | I | I |
| 01340 | 168A North of Seeps | C | I |
| 01341 | 168A Stock Driveway | M | M |
| 01342 | Knapp Individual | C | C |
| 01343 | Tuff Creek Pasture | C | I |
| 01344 | Westfall | I | I |
| 01345 | Mountain Pasture | C | I |
| 01346 | Bonneville Reservoir | I | I |
| 01347 | Jones Creek Basin | I | M |
| 01348 | J. Herbst Summer | M | I |
| 01349 | J. Herbst Tuff Creek | C | I |
| 01350 | Wm. Herbst Summer | C | C |
| 01351 | Scott Draw | I | M |
| 01352 | Joe Johns Pasture | C | C |
| 01353 | Campbell | M | M |
| 01354 | Stinking Well | I | I |
| 01355 | Lookout Hill | M | M |
| 01356 | Howard Pasture | I | I |
| 01357 | Summer Allotment | M | M |
| 01358 | Top of Mountain Pasture | C | C |
| 01359 | Ramage Ranch | I | I |
| 01360 | Ruth Fuller Private | C | C |
| 01361 | Copper Mountain (Lander) | C | C |
| 01362 | Lybyer South | I | M |
| 01363 | Hoodoo HQ Pastures | C | C |
| 01364 | Red Ranch Pasture | C | C |
| 01365 | Quien Sabe Ranch Pasture | I | M |

| Allotment | Allotment Name | Existing RMP | Proposed New Category |
|---|---|---|---|
| 01366 | Cabin Pasture | C | C |
| 01367 | Henrich Pasture | I | I |
| 01368 | Bridger Creek | C | C |
| 01369 | Picard Ranch HQ | C | C |
| 01373 | Copper Mountain | C | C |
| 01401 | Rim Pasture | I | I |
| 01402 | Delfelder Allotment | I | I |
| 01403 | Conant Creek Common | I | I |
| 01404 | Wm. Herbst Winter | I | I |
| 01405 | Posey North Allotment | I | I |
| 01406 | Poison Creek | M | M |
| 01407 | Muskrat AMP | I | I |
| 01408 | Township Pasture | I | I |
| 01409 | Muskrat Open | I | I |
| 01410 | Posey Pasture | I | I |
| 01411 | Shoshoni Road | I | I |
| 01412 | Poston Winter | I | M |
| 01413 | Pipeline Pasture | I | M |
| 01414 | Anderson Winter | M | M |
| 01415 | Myers Pasture | I | M |
| 01416 | Lame Jack Draw | I | I |
| 01417 | Haybarn Hill | C | I |
| 01512 | South Dobie Flat | M | I |
| 01518 | Little Bug Pasture | M | M |
| 01519 | Miller Springs Pasture | M | I |
| 01520 | School Pasture | M | M |
| 01521 | Riddle Pasture | M | M |
| 01523 | Bug Lake | M | M |
| 01601 | Dodds Allotment | M | M |
| 01604 | #17 Horse Heaven Pasture | M | I |
| 01605 | #18 Horse Creek Pasture | M | M |
| 01606 | #19 Vinegar Hill Pasture | M | M |
| 01607 | #16 Phillips Pasture | M | M |
| 01608 | #20 Calf Pasture | M | M |
| 01609 | #21 Horse Pasture | M | M |
| 01610 | #22 Bull Pasture | C | C |
| 01612 | Hamilton Rock Pasture | M | M |
| 01614 | Circle Bar Allotment | M | I |
| 01615 | North of Drift Fence | M | I |
| 01616 | Keester | M | M |
| 01619 | Winter Pastures | M | M |
| 01620 | Cabin Creek Pasture | C | C |
| 01622 | Hat Ranch | I | M |
| 01623 | Murphree Pastures | I | I |
| 01625 | Jamerman Pastures | M | M |
| 01626 | Mud Lake | C | C |
| 01628 | Sage Hen | M | M |
| 01629 | JJ Winter Pastures | C | C |
| 01630 | Tram Road Pasture | M | I |
| 01631 | Claytor Homestead | C | C |
| 01632 | North Hat Pasture | M | M |
| 01633 | Stamped Bog | C | M |
| 01635 | Big Rock Pasture | I | I |

| Allotment | Allotment Name | Existing RMP | Proposed New Category |
|---|---|---|---|
| 01636 | Granite Mountain Open | I | I |
| 01638 | Winter Allotment | M | M |
| 01640 | Garson Ranch | C | C |
| 01642 | Devils Gate | M | M |
| 01644 | Turkey Track | I | I |
| 01660 | Home, North of Highway | M | M |
| 01701 | Flagg AMP | I | I |
| 01702 | Flagg Individual | C | C |
| 01703 | Big Pasture | I | I |
| 01704 | Breeding Pasture | M | M |
| 01705 | Myers Fenced Pasture | I | I |
| 01706 | Trent & Home Place | M | M |
| 01707 | Ice Slough | I | I |
| 01709 | Long Creek Pasture | I | M |
| 01710 | Graham Ranch Pasture | M | M |
| 01711 | Hay Meadow Pasture | C | C |
| 01712 | Long Creek Sweetwater | C | C |
| 01713 | Whitlock Fenced | I | I |
| 01714 | Scarlett Pasture | C | C |
| 01715 | Horse Pasture | M | M |
| 01716 | Dishpan Butte | I | I |
| 01717 | Fenced Individual | I | M |
| 01801 | East Beaver Common | I | I |
| 01802 | Sand Draw AMP | I | I |
| 01803 | Government Draw | I | I |
| 01804 | Government Draw – Lower Beaver | I | I |
| 01805 | Kirby-Reservation Boundary | I | I |
| 01806 | Griffin Beaver Creek | M | M |
| 01807 | Baldwin Pasture | I | I |
| 01808 | Hudson Draw Private Allotment | M | M |
| 01809 | Bringolf Ranch | C | C |
| 01810 | Yellowstone Ranch | C | C |
| 01813 | Blue Ridge | C | C |
| 01814 | Highway Pasture | C | C |
| 01901 | Atlantic City Common | I | I |
| 01902 | Cottonwood Basin | I | I |
| 01903 | Silver Creek Common | I | I |
| 01904 | Devils Canyon AMP | I | I |
| 01905 | Ellis Upper Beaver | I | I |
| 01906 | Twin Creek Individual | I | I |
| 01907 | Commissary Hill | I | M |
| 01908 | Little Popo Agie AMP | I | M |
| 01909 | Onion Flat | I | I |
| 01910 | Sawmill Basin | I | I |
| 01911 | Red Canyon AMP | I | I |
| 01912 | Twin Creek Private | C | C |
| 01913 | McGraw Flat Individual | I | I |
| 01914 | McGraw Flat Common | I | I |
| 01915 | Beaver AMP | I | I |
| 01916 | Hall Creek Individual | I | I |

| Allotment | Allotment Name | Existing RMP | Proposed New Category |
|---|---|---|---|
| 01917 | Cottonwood Divide | I | I |
| 01918 | McGraw Flat-U. Beaver | I | I |
| 01919 | Gravel Springs Allotment | I | I |
| 01920 | Salisbury AMP | I | I |
| 01921 | Level Meadows | I | I |
| 01922 | P. Heart Individual | I | I |
| 01923 | Atlantic City Upper Fenced | C | C |
| 01924 | Atlantic City Lower Fenced | C | C |
| 01925 | Hall Creek Winter Past | M | M |
| 01926 | McKinney Individual | I | I |
| 01927 | Upper Ellis Ranch | C | C |
| 01928 | Lower Ellis Ranch | C | C |
| 01929 | Barras Spring | C | C |
| 01930 | Long Willow | C | C |
| 1931 | Woolery Individual | M | M |
| 01932 | Sheep Mountain | M | M |
| 01933 | Lazy Y | C | C |
| 01934 | Red Canyon Rim | I | M |
| 01935 | Bowman Ranch | C | C |
| 01936 | Derby Allotment | M | M |
| 01937 | Little Knoll | C | C |
| 01938 | Bergstedt Ranch | C | C |
| 01939 | Auer Ranch | C | C |
| 01940 | Henton Ranch | C | C |
| 01941 | Flat Onion | I | I |
| 01943 | Red Bluff Creek | M | M |
| 02009 | Alkali Pasture | M | M |
| 02011 | Highway Allotment | I | I |
| 02019 | Cooper Creek | M | M |
| 02021 | Willow Creek Allotment | C | C |
| 02023 | Crooks Gap | M | M |
| 02025 | Leckinby Pasture | M | M |
| 02026 | Little Camp Creek | I | I |
| 02028 | Mitchell Pasture | C | C |
| 02029 | Diamond Hook | C | C |
| 02103 | Lime Kiln Gulch | C | C |
| 02104 | Little Warm Spring Canyon | M | M |
| 02106 | Fire Ridge | M | M |
| 02107 | Wells 11 | M | M |
| 02108 | Geyser Creek | M | M |
| 02109 | Cross 14 | C | C |
| 02110 | Little Horse Creek | I | I |
| 02111 | E A Mountain 16 | M | M |
| 02112 | Bear Creek No. 2112 | C | C |
| 02113 | Crooked Creek | C | C |
| 02114 | Spence 23 | C | C |
| 02115 | Hat Butte Ranch | C | C |
| 02116 | Elk Ridge Southeast | C | C |
| 02117 | Blue Holes | C | C |
| 02119 | White Pass 31 | C | C |
| 02120 | Windy Ridge | C | C |
| 02121 | Mason Draw | I | I |
| 02122 | Tappan Creek 34 | I | I |

| Allotment | Allotment Name | Existing RMP | Proposed New Category |
|---|---|---|---|
| 02123 | Battrum Mountain | C | I |
| 02125 | Albright 47 | C | C |
| 02126 | CM 49 | M | M |
| 02127 | Wagon Gulch | C | C |
| 02128 | Bitterroot 60 | C | C |
| 02130 | Cross 67 | C | C |
| 02132 | Stoney Point 73 | C | C |
| 02201 | North Fork Rim | M | M |
| 02202 | Baldwin Creek School | C | C |
| 02203 | Madison Creek | C | C |
| 02204 | Table Mountain 9 | C | C |
| 02205 | Hopkins 13 | I | I |
| 02206 | Wickstrom 17 | I | C |
| 02207 | Steers 19 | I | I |
| 02208 | Pine Bar 21 | M | M |
| 02210 | Willow Creek 24 | I | I |
| 02211 | Squaw Creek | I | I |
| 02212 | Frank Ranch 28 | C | C |
| 02213 | Spriggs 36 | I | C |
| 02214 | Meyer Basin | I | I |
| 02215 | Wunder 38 | I | C |
| 02216 | Day 39 | C | C |
| 02217 | Nicholas 40 | I | I |
| 02218 | Double A 41 | I | I |
| 02219 | Orchard Draw | I | I |
| 02220 | Red Butte | I | I |
| 02221 | Juniper Hill | C | C |
| 02222 | School Allotment | I | I |
| 02223 | Baldwin Creek 51 | I | I |
| 02224 | Natural Lake | C | C |
| 02225 | Crump 53 | I | I |
| 02226 | Hunter | C | C |
| 02227 | Smith Creek | C | C |
| 02228 | Spriggs 57 | I | I |
| 02229 | Kaper 59 | C | C |
| 02230 | Table Mountain 61 | C | C |
| 02231 | Booth 62 | C | C |
| 02232 | Beason Creek 63 | I | I |
| 02233 | Batrum Gap | C | C |
| 02234 | Sjostrom 66 | C | C |
| 02235 | Horny Toad Associate | I | I |
| 02236 | Freeman 70 | I | I |
| 02237 | North Fork | C | C |
| 02238 | Hilltop | C | C |
| 02239 | Cyclone Pass | I | I |
| 02240 | Harvey Basin | I | I |
| 02520 | Woods Basin | C | C |
| 10160 | Cedar Ridge LRA | C | C |
| 10203 | Cherry Creek | I | I |
| 10205 | Bar Eleven | I | I |
| 10224 | Stewart Creek | I | I |
| 10533 | Steamboat Lake | C | C |
| 11501 | Muskat-Linn | I | I |

| Allotment | Allotment Name | Existing RMP | Proposed New Category |
|---|---|---|---|
| 11502 | Fraser Draw | M | M |
| 11504 | Canyon Creek | I | M |
| 11505 | South Deer Creek | I | M |
| 11506 | Deer Creek AMP | I | I |
| 11507 | South Cross L | M | M |
| 11508 | Gas Hills | M | I |
| 11509 | Diamond Springs | I | I |
| 11510 | North Willow Creek | M | M |
| 11511 | North Dobie Flat | M | I |
| 11513 | Blackjack Ranch | I | I |
| 11514 | Gap Pasture | M | M |
| 11515 | Cross L Pastures | M | M |
| 11516 | Basin Pasture | M | I |
| 11517 | Bug Meadows Pastures | M | M |
| 12002 | Harris Slough Past | C | C |
| 12003 | Whiskey Peak Incomm. | I | I |
| 12004 | Green Mountain Fenced | I | I |
| 12005 | Home, South of Highway | I | I |
| 12006 | 46 Pasture | I | I |
| 12007 | Rigby Pasture | I | I |
| 12012 | East Allotment | M | M |
| 12013 | Fenced Allotment | I | I |
| 12014 | South Hat Pasture | M | M |
| 12015 | Hadsell Pasture | I | I |
| 12016 | State-71 Meadows | C | C |
| 12018 | Alma Grieve Pasture | M | M |
| 12020 | Cottonwood Pasture | M | M |
| 12242 | Squaw Creek | C | C |
| 14289 | Upper Poison Spider Creek | I | I |
| 14808 | Three Crossings Allotment | M | M |
| 20213 | Elkhorn – LRA | I | I |
| 21522 | Decker Pasture | M | C |
| 31519 | Beef Gap Pasture | M | I |
| 32001 | Green Mountain CMN | I | I |

Note: Data in table derived from Bureau of Land Management Lander Field Office internal databases accessed in 2010.

AMP Allotment Management Plan
RMP Resource Management Plan

## Table K.3. Lander Field Office Grazing Allotments Assessed for Meeting Standards

| Allotment Number | Allotment Name | Year Assessed | Acres Assessed | Meeting Standards | Not Meeting Standards – Management Implemented | Not Meeting Standards – Causal Factors Not Determined | Not Meeting Standards – Other Than Livestock Grazing |
|---|---|---|---|---|---|---|---|
| 1304 | Crawford Creek | 2012 | 2,342 | | | X | |
| 1306 | Canning | 2012 | 347 | | | X | |
| 1307 | Mallet-Smith Pasture | 2003 | 181 | X | | | |
| 1310 | Cotton-wood Pass | 2012 | 2,317 | | | X | |

| Allotment Number | Allotment Name | Year Assessed | Acres Assessed | Meeting Standards | Not Meeting Standards – Management Implemented | Not Meeting Standards – Causal Factors Not Determined | Not Meeting Standards – Other Than Livestock Grazing |
|---|---|---|---|---|---|---|---|
| 1318 | Below the Hill | 2012 | 2,548 | | | X | |
| 1323 | Fuller Allotment | 2012 | 3,050 | | | X | |
| 1324 | Hoodoo Creek | 2001 | 23,209 | | X | | |
| 1327 | Myrtle Reed | 2003 | 1,209 | X | | | |
| 1329 | Lysite Mountain | 2012 | 8,194 | | | X | |
| 1330 | Battle Axe Lysite | 2000 | 4,298 | X | | | |
| 1334 | Cottonwood Pass | 2012 | 3,890 | | | X | |
| 1335 | OCLA South of Railroad | 2000 | 6,413 | X | | | |
| 1336 | OCLA North of Railroad | 2000 | 4,861 | | X | | |
| 1337 | De Pass Ranch | 2000 | 472 | X | | | |
| 1338 | Fuller Ranch Pasture | 2000 | 1,477 | | X | | |
| 1340 | 168A North of Seeps | 2012 | 794 | X | | | |
| 1341 | Stock Driveway | 2000 | 2,185 | | X | | |
| 1344 | Westfall | 2012 | 3,620 | | | X | |
| 1345 | Mountain Pasture | 2012 | 1,135 | | | X | |
| 1347 | Jones Creek Basin | 2012 | 1,292 | | | X | |
| 1348 | J. Herbst Summer | 2012 | 2,385 | | | X | |
| 1350 | Wm Herbst Summer | 2012 | 699 | | | X | |
| 1352 | Joe Johns Pasture | 2012 | 1,109 | X | | | |
| 1357 | Summer Allotment | 2012 | 182 | X | | | |
| 1358 | Top Of Mountain Pasture | 2001 | 1,449 | X | | | |
| 1359 | Ramage Ranch | 1998 | 12,060 | | | | X |
| 1360 | Ruth Fuller Private | 2012 | 89 | | | X | |
| 1361 | Copper Mountain | 2012 | 288 | X | | | |
| 1363 | Hoodoo HQ Pasture | 2001 | 149 | | | X | |
| 1366 | Cabin Pasture | 2012 | 265 | | | X | |

| Allotment Number | Allotment Name | Year Assessed | Acres Assessed | Meeting Standards | Not Meeting Standards – Management Implemented | Not Meeting Standards – Causal Factors Not Determined | Not Meeting Standards – Other Than Livestock Grazing |
|---|---|---|---|---|---|---|---|
| 1367 | Heinrich Pasture | 2012 | 81 | X | | | |
| 1369 | Picard Ranch HQ | 2000 | 169 | | X | | |
| 1373 | Copper Mountain | 2001 | 128 | X | | | |
| 1401 | Rim Pasture | 2000 | 19,095 | X | | | |
| 1403 | Conant Creek | 2000 | 50,376 | X | | | |
| 1404 | Wm. Herbst Winter | 2000 | 2,989 | | X | | |
| 1405 | Posey North | 2000 | 4,431 | | X | | |
| 1412 | Poston Winter | 2000 | 3,239 | X | | | |
| 1414 | Anderson Winter | 2000 | 5,924 | X | | | |
| 1416 | Lame Jack Draw | 2000 | 6,060 | X | | | |
| 1417 | Haybarn Hill | 2000 | 10,288 | X | | | |
| 1506 | Deer Creek AMP | 1998 | 7,000 | | | | X |
| 1508 | Gas Hills | 1998 | 42,201 | X | | | |
| 1509 | Diamond Springs | 2008 | 40,890 | | X | | |
| 1511 | North Dobie Flat | 2008 | 11,435 | | X | | |
| 1512 | South Dobie Flat | 2008 | 6,752 | | X | | |
| 1513 | Black Jack Ranch | 2008 | 31,708 | | X | | |
| 1633 | Stampede Bog | 2000 | 301 | X | | | |
| 1704 | Breeding Pasture | 2001 | 17,107 | X | | | |
| 1705 | Myers Fenced Pasture | 2001 | 1,288 | X | | | |
| 1706 | Trent & Home Place | 2001 | 500 | X | | | |
| 1707 | Ice Slough | 2002 | 947 | X | | | |
| 1709 | Long Creek Pasture | 2001 | 2,406 | X | | | |
| 1710 | Graham Ranch Pasture | 2001 | 1,118 | X | | | |
| 1712 | Long Creek Sweetwater | 2001 | 388 | X | | | |
| 1713 | Whitlock Fenced | 2001 | 1,086 | X | | | |
| 1714 | Scarlett Pasture | 2001 | 173 | X | | | |

| Allotment Number | Allotment Name | Year Assessed | Acres Assessed | Meeting Standards | Not Meeting Standards – Management Implemented | Not Meeting Standards – Causal Factors Not Determined | Not Meeting Standards – Other Than Livestock Grazing |
|---|---|---|---|---|---|---|---|
| 1715 | Horse Pasture | 2004 | 133 | X | | | |
| 1802 | Sand Draw AMP | 1999 | 11,092 | X | | | |
| 1805 | Kirby Reservation Boundary | 2000 | 5,333 | X | | | |
| 1806 | Griffin Beaver Creek | 2000 | 6,068 | X | | | |
| 1901 | Atlantic City Common | 2001 | 39,094 | | X | | |
| 1903 | Silver Creek Common | 2000 | 33,702 | | X | | |
| 1904 | Devils Canyon AMP | 2004 | 3,717 | | | X | |
| 1905 | Ellis Upper Beaver | 2000 | 3,326 | X | | | |
| 1906 | Twin Creek Individual | 1998 | 7,602 | X | | | |
| 1908 | Little Popo Agie AMP | 1998 | 8,651 | X | | | |
| 1911 | Red Canyon AMP | 1999 | 3,699 | | X | | |
| 1914 | McGraw Flat Common | 2000 | 10,149 | X | | | |
| 1915 | Beaver AMP | 2004 | 10,640 | | | X | |
| 1916 | Hall Creek Individual | 1998 | 12,711 | | | | X |
| 1921 | Level Meadows | 2000 | 3,271 | X | | | |
| 1923 | Atlantic City Upper Fenced | 2000 | 60 | X | | | |
| 1924 | Atlantic City Lower Fenced | 2000 | 78 | X | | | |
| 1925 | Hall Creek Winter Pasture | 1998 | 1,305 | X | | | |
| 1927 | Upper Ellis Ranch | 2002 | 598 | X | | | |
| 1928 | Lower Ellis Ranch | 2002 | 339 | X | | | |
| 1934 | Red Canyon Rim | 1998 | 853 | X | | | |
| 1939 | Auer Ranch | 2004 | 427 | X | | | |
| 2001 | Green Mountain Common | 1999 | 466,474 | | X | | |

| Allotment Number | Allotment Name | Year Assessed | Acres Assessed | Meeting Standards | Not Meeting Standards – Management Implemented | Not Meeting Standards – Causal Factors Not Determined | Not Meeting Standards – Other Than Livestock Grazing |
|---|---|---|---|---|---|---|---|
| 2002 | Harris Slough Pasture | 2001 | 94 | X | | | |
| 2103 | Lime Kiln Gulch | 2012 | 1,159 | X | | | |
| 2104 | Little Warm Sp. Cnyn | 2012 | 315 | X | | | |
| 2106 | Fire Ridge | 2012 | 148 | X | | | |
| 2107 | Wells 11 | 2012 | 305 | X | | | |
| 2108 | Geyser Creek | 2012 | 829 | X | | | |
| 2109 | Cross 14 | 2012 | 643 | X | | | |
| 2110 | Little Horse Creek | 2012 | 720 | X | | | |
| 2111 | E A Mountain 16 | 2012 | 1,761 | X | | | |
| 2113 | Crooked Creek | 2012 | 1,247 | X | | | |
| 2115 | Hat Butte | 2012 | 893 | X | | | |
| 2116 | Elk Ridge Southeast | 2012 | 316 | X | | | |
| 2117 | Blue Holes | 2012 | 682 | X | | | |
| 2119 | White Pass 31 | 2012 | 650 | X | | | |
| 2120 | Windy Ridge | 2012 | 332 | X | | | |
| 2121 | Mason Draw | 2012 | 6,813 | X | | | |
| 2122 | Tappan Creek 34 | 2012 | 1,065 | X | | | |
| 2123 | Battrum Mountain | 2012 | 5,936 | X | | | |
| 2125 | Albright 47 | 2012 | 286 | X | | | |
| 2126 | CM 49 | 2012 | 940 | X | | | |
| 2127 | Wagon Gulch | 2012 | 80 | X | | | |
| 2128 | Bitterroot 60 | 2012 | 691 | X | | | |
| 2130 | Cross 67 | 2012 | 591 | X | | | |
| 2132 | Stoney Point 73 | 2012 | 121 | X | | | |
| 2210 | Willow Creek | 2009 | 982 | | | X | |
| 2219 | Orchard Draw | 1998 | 1361 | X | | | |
| 2520 | Woods Basin | 2012 | 173 | X | | | |
| **Number of allotments** | | | 107 | 71 | 15 | 18 | 3 |
| **Total Acreage** | | | 1,019,044 | 266,537 | 673,075 | 47,661 | 31,771 |
| Note: Data in table derived from Bureau of Land Management Lander Field Office internal databases. | | | | | | | |

## Table K.4. Allotment Management Plans and Rangeland Management Agreements Developed

| Allotment Number | Allotment Name | AMP Implement Date | Public Acres |
|---|---|---|---|
| 01330 | Battle Axe Lysite | 08/23/89 | 4,298 |
| 01361 | Copper Mountain (Lander) | 03/29/96 | 270 |

| Allotment Number | Allotment Name | AMP Implement Date | Public Acres |
|---|---|---|---|
| 01401 | Rim Pasture | 05/01/92 | 19,037 |
| 01403 | Conant Creek Common | 07/15/92 | 47,078 |
| 01406 | Poison Creek* | 08/06/97 | 16,815 |
| 01407 | Muskrat AMP | 11/01/68 | 39,876 |
| 01408 | Township Pasture* | 05/16/94 | 19,162 |
| 01414 | Anderson Winter | 05/01/92 | 5,914 |
| 01415 | Myers Pasture* | 06/10/95 | 923 |
| 01512 | South Dobie Flat | 06/11/92 | 6752 |
| 01636 | Granite Mountain Open* | 03/24/93 | 77,896 |
| 01643 | Rawlins Draw | 05/21/08 | 6,367 |
| 01660 | Home, North of Highway | 06/11/92 | 1,353 |
| 01701 | Flagg AMP | 06/01/69 | 11,361 |
| 01703 | Big Pasture | 07/05/91 | 74,351 |
| 01802 | Sand Draw AMP | 05/01/66 | 11,905 |
| 01803 | Government Draw | 11/26/90 | 77,299 |
| 01901 | Atlantic City Common | 07/31/97 | 38,765 |
| 01903 | Silver Creek Common | 05/08/97 | 31,953 |
| 01904 | Devils Canyon AMP | 05/01/69 | 3,717 |
| 01905 | Ellis Upper Beaver | 05/01/70 | 2,370 |
| 01906 | Twin Creek Individual | 03/28/93 | 7,532 |
| 01907 | Commissary Hill | 06/14/94 | 994 |
| 01908 | Little Popo Agie AMP | 06/01/70 | 10,760 |
| 01911 | Red Canyon AMP | 06/01/69 | 4009 |
| 01914 | Mcgraw Flat Common | 05/08/97 | 11,295 |
| 01915 | Beaver AMP | 06/01/69 | 10,640 |
| 01916 | Hall Creek Individual | 12/20/89 | 14,386 |
| 01920 | Salisbury AMP | 11/01/69 | 5,384 |
| 01925 | Hall Creek Winter Past | 12/20/89 | 492 |
| 01926 | McKinney Individual* | 04/03/97 | 800 |
| 01934 | Red Canyon Rim | 06/14/94 | 853 |
| 01939 | Auer Ranch | 06/01/69 | 427 |
| 102019 | Cooper Creek | 10/01/87 | 1,402 |
| 02021 | Willow Creek Allotment | 10/01/87 | 71 |
| 02029 | Diamond Hook | 10/01/87 | 207 |
| 02219 | Orchard Draw | 06/09/69 | 804 |
| 11504 | Canyon Creek | 02/25/99 | 11,065 |
| 11505 | South Deer Creek | 09/23/88 | 11,225 |
| 11506 | Deer Creek AMP | 05/01/69 | 6,447 |
| 11507 | South Cross L | 06/11/92 | 2,347 |
| 11509 | Diamond Springs | 06/11/92 | 40,890 |
| 11510 | North Willow Creek* | 05/21/08 | 3469 |
| 11511 | North Dobie Flat | 06/11/92 | 11,435 |
| 11513 | Blackjack Ranch | 06/11/92 | 31,708 |
| 11514 | Gap Pasture | 06/11/92 | 3,604 |
| 11515 | Cross L Pastures | 06/11/92 | 1,535 |
| 11516 | Basin Pasture | 02/16/01 | 16,830 |
| 12003 | Whiskey Peak | 10/01/87 | 76,083 |
| 12005 | Home, South Of Highway | 06/11/92 | 2,560 |
| 12018 | Alma Grieve Pasture | 10/01/87 | 3,249 |
| 31519 | Beef Gap Pasture | 06/11/92 | 381 |

| Allotment Number | Allotment Name | AMP Implement Date | Public Acres |
|---|---|---|---|
| **Total Allotments:** | **52** | **Total Acres:** | **790,346** |

Note: Data in table derived from Bureau of Land Management Lander Field Office internal databases accessed in 2012.
*Denotes Rangeland Management Agreement.

AMP Allotment Management Plan

## Table K.5. Summary of Range Improvements Lander Field Office, 1986-2009

| Fiscal Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Improvement Fences** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Antelope drop panels | | | | | | | | 18.5 | | | | | | | | | | | | 0.1 | | | | | 18.6 |
| Electric | | | | | | | | 5 | 3 | | 3 | 9 | | 5 | 9 | 34 | 10 | 4.75 | | 20.9 | 9.7 | | | | 113.38 |
| Exclosures, enclosures | | | 1 | 2 | 1 | 5.5 | 3.3 | | 1.4 | 1.4 | 1 | 0.5 | | | | | 5.7 | 2.7 | 1 | 1 | | | | | 27.5 |
| Four strand plus | 23.1 | 9.7 | 2.7 | | 1 | | | 1 | 1 | 1 | 0.52 | 3.13 | | 0.35 | 2.7 | 6.8 | 6.2 | 2.05 | | 1.4 | 1 | 1.25 | | | 64.9 |
| Three strand | | 4 | 1 | | 17 | 4.2 | 9.05 | 11.2 | 5.84 | 6.3 | | 29.2 | 11.2 | | 4.8 | 3 | 5 | 2.6 | | 9.4 | 2.5 | | | | 126.19 |
| Wood Rail | | | | | | | | | | | | | 0.1 | 0.25 | | | | | 0.25 | 0.1 | | 0.5 | | | 1.2 |
| Other | | | 0.1 | | | 1.3 | 0.2 | 1 | | | | | | | 1 | | | | | | | | | | 3.6 |
| **Fence Total (Miles)** | **23.1** | **13.7** | **4.8** | **2** | **19** | **11** | **12.6** | **36.7** | **11.2** | **8.7** | **4.52** | **41.8** | **11.3** | **5.6** | **17.5** | **43.8** | **26.9** | **12.1** | **1.25** | **32.9** | **13.2** | **1.75** | **0** | **0** | **355.4** |
| **Land Treatments** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lake and Wetland Improvement | | | | | 1 | | | | | | | | | | | | | | | 3 | | | 1 | | 5 |

| Fiscal Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lake and Wetland Improvement Total | | | | | | | | | | | | | | | | | | | | 3 | | | 1 | | 4 |
| Land Treatment | | | | | | 5 | | 6.5 | 50 | 9 | 35 | | | | | | 100 | | 100 | | | | | | 305.5 |
| **Land Treatment Total** | | | | | **1** | **5** | | **6.5** | **50** | **9** | **35** | | | | | | **100** | | **100** | **6** | | | **2** | | **314.5** |
| **Management Facility** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cattleguard for vehicle use | 2 | 2 | 1 | | | 1 | 2 | | 1 | 7 | | | 1 | | 11 | | | | 1 | | | | | | 29 |
| Corrals and loading chutes | | | | | | 1 | | | | | | | | | | | | | | | | | | | 1 |
| Line Cabins | | | | | | | | | | | | | | | | | 1 | | | | | | | | 1 |
| Other | | | | | | | | | | | | | | | | | | | | 1 | | | | | 1 |

| Fiscal Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Management Facility Total (Each)** | **2** | **2** | **1** | | | **2** | **2** | | **1** | **7** | | | **1** | | **11** | | **1** | | **1** | **1** | | | | | **32** |
| **Vegetation Manipulation** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Stream Improvement | | | | | | | | | | | 1 | | | | | | | | | | | | | | 1 |
| Chemical | | | | | | | | | | | | | | | | | | | | 313 | | | 2,300 | | 2,613 |
| Cutting or Beating | | | | | | | | | | | | | | | | | | | | | 4,000 | 1,220 | | | 5,220 |
| Prescribed Fire | 910 | 160 | 250 | 100 | | | 1,228 | | 12 | | | 56 | | | | | | | | | | | | | 2,716 |
| **Vegetation Manipulation Total (Acres)** | **910** | **160** | **250** | **100** | | | **1,228** | | **12** | | **1** | **56** | | | | | | | | **313** | **4,000** | **1,220** | **2,300** | | **10,550** |
| **Water Control/ Development** | | | | | | | | | | | | | | | | | | | | | | | | | |

| Fiscal Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipelines (miles) | 1 | 5 | | 4 | 9 | | 9.2 | 3 | 5 | | 1 | 7.26 | 10 | 5 | 38 | 1 | | 2 | | 7.5 | | 0 | 1 | 1 | 109.96 |
| Check Dams, earthen (each) | | | | 2 | | | | | | | | | | | | | | | | | | | | | 2 |
| Reservoirs (each) | 6 | 5 | 2 | 2 | 6 | 1 | 4 | 2 | 6 | 5 | 3 | | 3 | 1 | | 2 | 5 | | | | | | | | 53 |
| Retention Dams: retains water/silt; primary object (each) | | | | | | | 1 | | 1 | | 1 | | | | | | | | | | | | | | 3 |
| Sheet piling drop structure (each) | | | | | | | | | | | | | 1 | | | | 1 | | | | | | | | 2 |
| Springs (each) | | 2 | 3 | | 1 | | 1 | 1 | 4 | 7 | 5 | 2 | 1 | 1 | 3 | 2 | 2 | 2 | | | | | 1 | | 38 |
| Supplemental Water Storage (each) | | | | | | | | | | | | 1 | 1 | | | | | | | | | | | | 2 |
| Wells (each) | 6 | | 4 | 4 | 8 | 3 | 3 | | 1 | 3 | 2 | 7 | 2 | 5 | 12 | 2 | 5 | 3 | 3 | 1 | 1 | | 1 | | 76 |

| Fiscal Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Water Control/ Development Total** | **12** | **7** | **9** | **8** | **15** | **4** | **9** | **3** | **12** | **15** | **11** | **10** | **8** | **7** | **15** | **6** | **13** | **5** | **3** | **1** | **1** | | **2** | **0** | **176** |
| Weed Control (acres) | 0 | 246 | 240 | 297 | 60 | 207 | 183 | 156 | 69 | 18 | 56 | 216 | 408 | 561 | 882 | 735 | 620 | 800 | 770 | 948 | 700 | 996 | 0 | 1,650 | 10,818 |

Note: Data in table derived from Bureau of Land Management Lander Field Office internal databases accessed in 2010.

## Table K.6. Animal Unit Months Authorized, 1989-2008

| Year | AUMs Billed | Percent Actual Use |
|---|---|---|
| 1989 | 230,351 | 82 |
| 1990 | 217,122 | 78 |
| 1991 | 211,366 | 76 |
| 1992 | 217,322 | 78 |
| 1993 | 227,202 | 81 |
| 1994 | 218,276 | 78 |
| 1995 | 223,874 | 80 |
| 1996 | 247,568 | 89 |
| 1997 | 221,688 | 79 |
| 1998 | 228,616 | 82 |
| 1999 | 245,140 | 88 |
| 2000 | 246,760 | 88 |
| 2001 | 220,107 | 77 |
| 2002 | 152,198 | 54 |
| 2003 | 143,590 | 51 |
| 2004 | 177,260 | 63 |
| 2005 | 191,272 | 68 |
| 2006 | 160,237 | 57 |
| 2007 | 143,026 | 51 |
| 2008 | 165,907 | 59 |
| 2009 | 193,800 | 69 |
| 2010 | 187,698 | 67 |
| 2011 | 200,161 | 72 |
| **Average Total:** | **203,067** | **73** |

Note: Data in table derived from Bureau of Land Management Lander Field Office internal databases accessed in 2010.

AUM Animal Unit Month

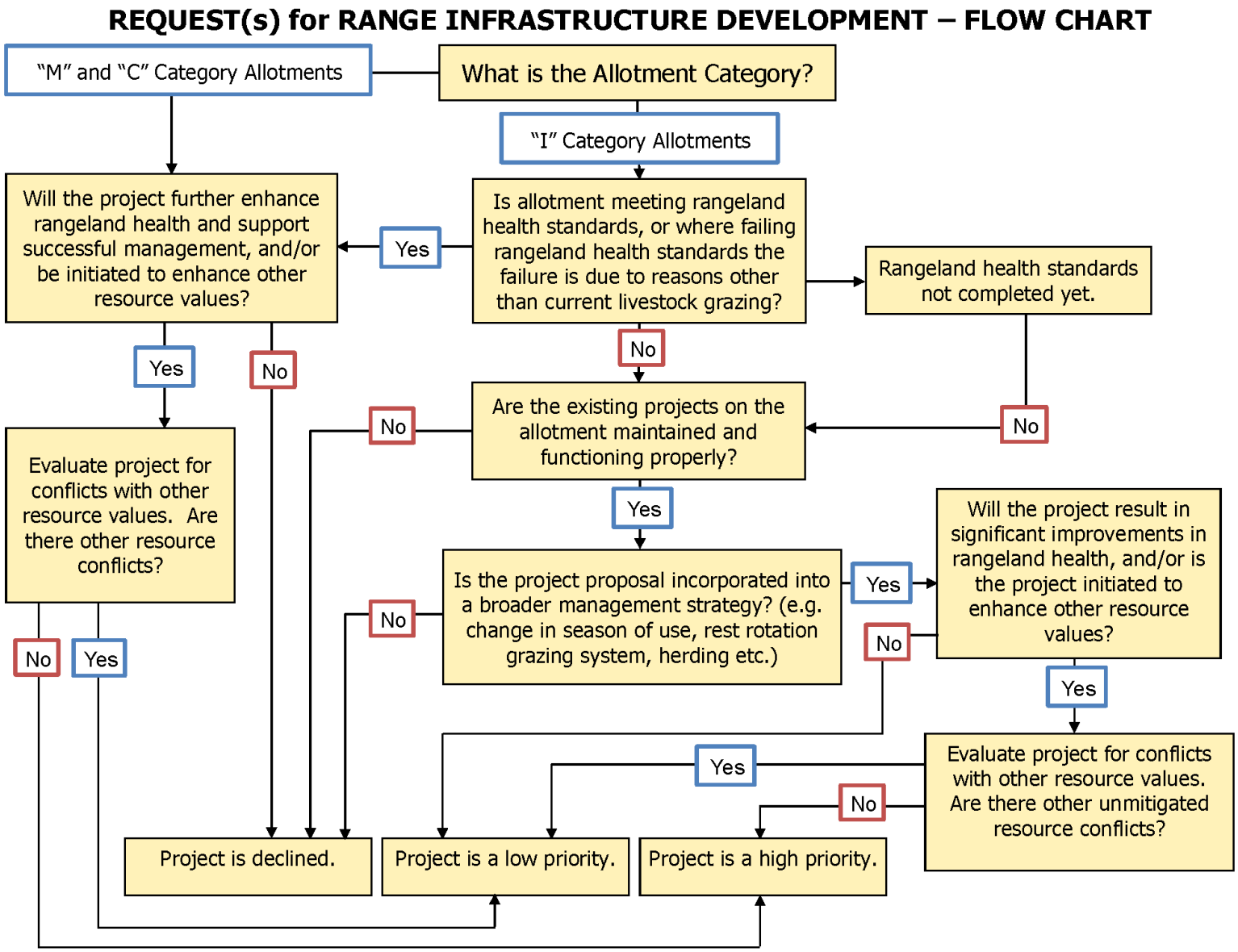


**Figure K.1. Range Infrastructure Development**

# Appendix L. Economic Impact Analysis Methodology

## L.1. Introduction

This appendix describes the methods and data that underlie the economic impact modeling analysis. Input-output models such as the Impact Analysis for Planning (IMPLAN) model, an economic impact analysis model, provide a quantitative representation of the production relationships between individual economic sectors. Thus, the economic modeling analysis uses information about physical production quantities and the prices and costs for goods and services. The inputs required to run the IMPLAN model are described in the following narrative and tables. The resulting estimates from the IMPLAN model, by alternative, can be found in the Economic Conditions section in Chapter 4. The first section of this appendix describes general aspects of the IMPLAN model and how it was used to estimate economic impacts. The remaining sections provide additional detailed data used in the analysis for oil and gas, livestock grazing, and recreation.

## L.2. The IMPLAN Model

IMPLAN is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. The model provides estimates of how a specific economic activity translates into jobs and income for the region. It includes the ripple effect (also called the "multiplier effect") of changes in economic sectors that may not be directly impacted by management actions, but are linked to industries that are directly impacted. In IMPLAN, these ripple effects are termed indirect impacts (for changes in industries that sell inputs to the industries that are directly impacted) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

This analysis used IMPLAN 2007; prior to running the model, cost and price data were converted to a consistent dollar year (2007) using regional and sector-specific adjustment factors from the IMPLAN model. The values in this appendix are expressed in year 2007 dollars so that the earnings and employment estimates can be easily compared to the latest (i.e., 2007) earnings and employment data available from the Bureau of Economic Analysis.

The current IMPLAN model has 440 economic sectors, of which 221 are represented in the five planning area counties. This analysis involved direct changes in economic activity for 33 IMPLAN economic sectors, as well as changes in all other related sectors due to the ripple effect. The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the study area. As a result, the calibrated model does a better job of generating multipliers and the subsequent impacts that reflect the interaction between and among the sectors in the study area compared to a model using unadjusted national coefficients. For instance, worker productivity in oil and gas production is higher in Wyoming than the national average. Key variables used in the IMPLAN model were filled in using data specific to Wyoming, including employment estimates, labor earnings, and total industry output. The IMPLAN model is run at a regional (multi-county) scale, with the coefficients that describe linkages between sectors aggregated to the five-county level. Because of this mathematical aggregation, it is not possible to identify total economic impacts for an individual community.

# L.3. Oil and Gas

The economic impacts analysis for oil and gas reflects drilling, completion, and production activities. The number of wells drilled and completed is based on the Reasonable Foreseeable Development scenario (BLM 2009c) and the constraints applied under each alternative. Total well numbers for each alternative are presented in Table L.1, "Oil and Gas Well Numbers" (p. 1584). Table L.2, "Projected Oil and Gas Production (Federal Surface)" (p. 1585) presents the quantity of oil and gas produced on federal surface, and Table L.3, "Projected Oil and Gas Production (Federal, State, and Fee Surface)" (p. 1586) presents the projected quantity of oil and gas produced from federal, state, and private (fee) surface.

**Table L.1. Oil and Gas Well Numbers**

| Item | Non-Coalbed Exploratory | Non-Coalbed Development | Coalbed Natural Gas | Deep | Total |
|---|---|---|---|---|---|
| **Federal Surface** | | | | | |
| Alternative A – Wells Drilled | 237 | 1,511 | 480 | 46 | 2,274 |
| Alternative A – Wells Completed | 142 | 1,209 | 432 | 37 | 1,820 |
| Alternative B – Wells Drilled | 189 | 1,209 | 93 | 37 | 1,528 |
| Alternative B – Wells Completed | 113 | 967 | 84 | 30 | 1,194 |
| Alternative C – Wells Drilled | 237 | 1,516 | 484 | 47 | 2,284 |
| Alternative C – Wells Completed | 142 | 1,213 | 436 | 38 | 1,828 |
| Alternative D – Wells Drilled | 227 | 1,447 | 406 | 45 | 2,125 |
| Alternative D – Wells Completed | 136 | 1,158 | 365 | 36 | 1,695 |
| **Federal, State, and Fee Surface** | | | | | |
| Alternative A – Wells Drilled | 331 | 2,107 | 823 | 73 | 3,334 |
| Alternative A – Wells Completed | 199 | 1,686 | 741 | 58 | 2,683 |
| Alternative B – Wells Drilled | 283 | 1,806 | 436 | 63 | 2,588 |
| Alternative B – Wells Completed | 170 | 1,445 | 392 | 50 | 2,057 |
| Alternative C – Wells Drilled | 331 | 2,112 | 827 | 74 | 3,344 |
| Alternative C – Wells Completed | 199 | 1,690 | 744 | 59 | 2,692 |
| Alternative D – Wells Drilled | 321 | 2,044 | 749 | 71 | 3,185 |
| Alternative D – Wells Completed | 193 | 1,635 | 674 | 57 | 2,559 |
| Source: BLM 2009c | | | | | |

## Table L.2. Projected Oil and Gas Production (Federal Surface)

| Year | Alternative A | | Alternative B | | Alternative C | | Alternative D | |
|---|---|---|---|---|---|---|---|---|
| | Gas (BCF) | Oil (MMBO) | Gas (BCF) | Oil (MMBO) | Gas (BCF) | Oil (MMBO) | Gas (BCF) | Oil (MMBO) |
| 2008 | 131.9 | 2.2 | 99.4 | 1.7 | 132.5 | 2.2 | 123.0 | 2.1 |
| 2009 | 147.7 | 2.2 | 111.4 | 1.7 | 148.3 | 2.2 | 137.8 | 2.1 |
| 2010 | 153.4 | 2.3 | 115.7 | 1.7 | 154.1 | 2.3 | 143.2 | 2.1 |
| 2011 | 154.5 | 2.3 | 116.5 | 1.7 | 155.2 | 2.3 | 144.1 | 2.1 |
| 2012 | 165.2 | 2.3 | 124.6 | 1.7 | 165.9 | 2.3 | 154.1 | 2.2 |
| 2013 | 180.7 | 2.3 | 136.3 | 1.8 | 181.5 | 2.3 | 168.6 | 2.2 |
| 2014 | 183.6 | 2.5 | 138.4 | 1.9 | 184.4 | 2.5 | 171.3 | 2.4 |
| 2015 | 195.9 | 2.4 | 147.7 | 1.8 | 196.7 | 2.4 | 182.8 | 2.2 |
| 2016 | 218.2 | 2.5 | 164.5 | 1.9 | 219.1 | 2.5 | 203.5 | 2.3 |
| 2017 | 213.0 | 2.4 | 160.6 | 1.8 | 214.0 | 2.4 | 198.8 | 2.2 |
| 2018 | 220.7 | 2.2 | 166.4 | 1.6 | 221.7 | 2.2 | 205.9 | 2.0 |
| 2019 | 244.0 | 2.4 | 184.0 | 1.8 | 245.1 | 2.5 | 227.6 | 2.3 |
| 2020 | 255.3 | 2.5 | 192.5 | 1.9 | 256.4 | 2.6 | 238.2 | 2.4 |
| 2021 | 270.5 | 2.7 | 204.0 | 2.0 | 271.8 | 2.7 | 252.4 | 2.5 |
| 2022 | 274.7 | 2.6 | 207.2 | 1.9 | 275.9 | 2.6 | 256.3 | 2.4 |
| 2023 | 280.8 | 2.8 | 211.8 | 2.1 | 282.1 | 2.8 | 262.0 | 2.6 |
| 2024 | 299.7 | 2.7 | 226.0 | 2.0 | 301.0 | 2.7 | 279.6 | 2.5 |
| 2025 | 305.8 | 2.7 | 230.6 | 2.1 | 307.2 | 2.7 | 285.4 | 2.5 |
| 2026 | 317.0 | 2.7 | 239.1 | 2.1 | 318.4 | 2.8 | 295.8 | 2.6 |
| 2027 | 318.4 | 2.9 | 240.1 | 2.2 | 319.9 | 2.9 | 297.1 | 2.7 |

Source: BLM 2009c. Estimated from production on federal, state, and fee surface, multiplied by the percentage of federal wells.

BCF billion cubic feet
MMBO million barrels of oil

**Table L.3. Projected Oil and Gas Production (Federal, State, and Fee Surface)**

| Year | Alternative A | | Alternative B | | Alternative C | | Alternative D | |
|---|---|---|---|---|---|---|---|---|
| | Gas (BCF) | Oil (MMBO) | Gas (BCF) | Oil (MMBO) | Gas (BCF) | Oil (MMBO) | Gas (BCF) | Oil (MMBO) |
| 2008 | 194.4 | 3.3 | 162.6 | 2.7 | 195.0 | 3.3 | 185.7 | 3.1 |
| 2009 | 217.7 | 3.3 | 182.1 | 2.8 | 218.4 | 3.3 | 208.0 | 3.1 |
| 2010 | 226.3 | 3.3 | 189.2 | 2.8 | 226.9 | 3.4 | 216.1 | 3.2 |
| 2011 | 227.8 | 3.4 | 190.5 | 2.8 | 228.4 | 3.4 | 217.6 | 3.2 |
| 2012 | 243.6 | 3.4 | 203.7 | 2.8 | 244.3 | 3.4 | 232.7 | 3.2 |
| 2013 | 266.4 | 3.4 | 222.8 | 2.9 | 267.2 | 3.4 | 254.5 | 3.3 |
| 2014 | 270.7 | 3.7 | 226.3 | 3.1 | 271.5 | 3.7 | 258.6 | 3.6 |
| 2015 | 288.8 | 3.5 | 241.5 | 2.9 | 289.7 | 3.5 | 275.9 | 3.4 |
| 2016 | 321.7 | 3.6 | 269.0 | 3.0 | 322.6 | 3.7 | 307.3 | 3.5 |
| 2017 | 314.1 | 3.5 | 262.7 | 2.9 | 315.0 | 3.5 | 300.1 | 3.3 |
| 2018 | 325.4 | 3.2 | 272.1 | 2.7 | 326.4 | 3.2 | 310.9 | 3.1 |
| 2019 | 359.7 | 3.6 | 300.8 | 3.0 | 360.8 | 3.6 | 343.7 | 3.4 |
| 2020 | 376.4 | 3.8 | 314.7 | 3.1 | 377.5 | 3.8 | 359.6 | 3.6 |
| 2021 | 398.9 | 3.9 | 333.6 | 3.3 | 400.1 | 3.9 | 381.1 | 3.7 |
| 2022 | 405.0 | 3.8 | 338.7 | 3.2 | 406.3 | 3.8 | 386.9 | 3.6 |
| 2023 | 414.0 | 4.1 | 346.2 | 3.4 | 415.3 | 4.1 | 395.5 | 3.9 |
| 2024 | 441.9 | 3.9 | 369.5 | 3.3 | 443.2 | 3.9 | 422.1 | 3.8 |
| 2025 | 451.0 | 4.0 | 377.1 | 3.4 | 452.3 | 4.0 | 430.8 | 3.8 |
| 2026 | 467.4 | 4.0 | 390.9 | 3.4 | 468.9 | 4.1 | 446.6 | 3.9 |
| 2027 | 469.5 | 4.3 | 392.6 | 3.6 | 470.9 | 4.3 | 448.5 | 4.1 |

Source: BLM 2009c

BCF billion cubic feet
MMBO million barrels of oil

The costs of drilling and completing wells and producing oil and gas are also relevant for the economic impact analysis, because a portion of these costs represents spending on local services and locally produced products. Table L.4, "Assumptions for Analysis of Economic Impacts for Oil and Gas Well Drilling and Completion According to Well Type" (p. 1587) provides a summary of the costs of drilling, completion, and production for each well type (non-coalbed development, non-coalbed exploratory, coalbed natural gas, and deep) used for the economic analysis.

**Table L.4. Assumptions for Analysis of Economic Impacts for Oil and Gas Well Drilling and Completion According to Well Type**

| Assumption | Well Type | | | |
|---|---|---|---|---|
| | Non-Coalbed Exploratory | Non-Coalbed Development | Coalbed Natural Gas | Deep |
| **Well Drilling Impacts** | | | | |
| Drilling Cost ($/well) | $1,292,076 | $1,174,615 | $434,648 | $5,603,020 |
| Local Drilling Costs[1] | 75% | 75% | 75% | 75% |
| Local Direct Impact ($/well) | $969,057 | $880,961 | $325,986 | $4,202,265 |
| Local Total Impact ($/well)[2] | $1,350,770 | $1,227,973 | $445,006 | $5,825,255 |
| Multiplier (total impact/direct impact) | 1.39 | 1.39 | 1.37 | 1.39 |
| **Well Completion Impacts** | | | | |
| Completion Cost ($/well) | $1,396,749 | $1,269,772 | $892,071 | $2,580,899 |
| Local Completion Costs[1] | 75% | 75% | 75% | 75% |
| Local Direct Impact ($/well) | $1,047,562 | $952,329 | $669,053 | $1,935,674 |
| Local Total Impact ($/well)[2] | $1,470,533 | $1,336,848 | $836,215 | $2,530,834 |
| Multiplier (total impact/direct impact) | 1.40 | 1.40 | 1.25 | 1.31 |

Source: BLM 2010i. Data are based on Authorizations For Expenditure provided by exploration and development companies, converted from 2009 to 2007 dollars using adjustment factors (that differ by economic sector) from the IMPLAN 2007 model.
[1] The local cost shares were based on the percent of total drilling or completion costs that would be spent on goods and services purchased from the local economy. Most services come from Rock Springs, Riverton, Rawlins and Casper. All of these communities are located within the planning area identified counties. However, a portion of the value comes from outside the planning area, even for supplies purchased locally, because the raw material and embedded labor comes from outside the planning area.
[2] Total impacts estimated using IMPLAN include direct, indirect, and induced impacts.

IMPLAN Impact Analysis for Planning

Table L.5, "Assumptions for Analysis of Economical Impacts on Output for Oil and Gas Production" (p. 1588) provides the assumptions used to determine the economic impact associated with the production of oil and gas. For the analysis, Bureau of Land Management (BLM) estimated a production cost (for gas) of $1.43 per thousand cubic feet (mcf), in year 2007 dollars, based on data from the Energy Information Administration (Taylor 2010).

**Table L.5. Assumptions for Analysis of Economical Impacts on Output for Oil and Gas Production**

| Economic Impact | Oil Production (per million barrels) | Gas Production (per billion cubic feet) |
|---|---|---|
| Direct Economic Impact[1] | $63,300,000[2] | $4,010,000[3] |
| Indirect Economic Impact[4] | $9,942,658 | $629,859 |
| Induced Economic Impact[5] | $2,678,476 | $169,679 |
| Total Economic Impact | $75,921,134 | $4,809,538 |
| Multiplier (total impact/direct impact) | 1.20 | 1.20 |

Note: All dollar values are in 2007 dollars.
[1]Direct economic impact is the market value of output.
[2]Based on an oil price of $63.30 per barrel, which is an average of the prices for 2009-2014 projected by the Wyoming Consensus Revenue Estimating Group (CREG 2009b) and adjusted to 2007 dollars.
[3]Based on a gas price of $4.01 per mcf, which is an average of the prices for 2009-2014 projected by the Wyoming Consensus Revenue Estimating Group (CREG 2009b) and adjusted to 2007 dollars.
[4]Indirect impacts from IMPLAN reflect increased demand in sectors that directly or indirectly provide supplies to the oil and gas industry.
[5]Induced impacts from IMPLAN reflect increased demand in the consumer and government sectors.

mcf thousand cubic feet
IMPLAN Impact Analysis for Planning

The forecasted number of wells and production used for estimating employment impacts is the same as for estimating impacts on labor earnings and output. Table L.6, "Assumptions for Employment Impact Analysis for Oil and Gas Well Drilling and Completion According to Well Type" (p. 1588) shows the direct and total employment impacts attributable to drilling and completion.

**Table L.6. Assumptions for Employment Impact Analysis for Oil and Gas Well Drilling and Completion According to Well Type**

| Employment Impact | Well Type | | | |
|---|---|---|---|---|
| | Non-Coalbed Exploratory | Non-Coalbed Development | Coalbed Natural Gas | Deep |
| **Well Drilling Impacts** | | | | |
| Direct Employment (jobs/well) | 4.40 | 4.00 | 1.50 | 19.80 |
| Total Employment Impact (jobs/well) | 7.59 | 6.90 | 2.50 | 32.80 |
| Multiplier (Total Impact/Direct Impact) | 1.73 | 1.73 | 1.67 | 1.66 |
| Average Earnings per Job (2007 dollars) | $57,776 | $57,776 | $56,203 | $59,044 |
| **Well Completion Impacts** | | | | |
| Direct Employment (jobs/well) | 5.28 | 4.80 | 2.10 | 7.50 |
| Total Employment Impact (jobs/well) | 8.80 | 8.00 | 3.50 | 12.50 |
| Multiplier (Total Impact/Direct Impact) | 1.67 | 1.67 | 1.67 | 1.67 |
| Average Earnings per Job (2007 dollars) | $58,859 | $58,859 | $58,835 | $59,315 |

Note: Direct and total employment impact and average earnings per job are calculated using IMPLAN.

IMPLAN Impact Analysis for Planning

Table L.7, "Assumptions for Employment Impacts Analysis for Oil and Gas Production" (p. 1589) shows the direct and total employment impacts associated with production.

**Table L.7. Assumptions for Employment Impacts Analysis for Oil and Gas Production**

| Employment Impact (annual number of jobs) | Oil Production (per million barrels) | Gas Production (per billion cubic feet) |
|---|---|---|
| Direct Employment | 31.7 | 2.0 |
| Indirect Employment | 57.0 | 3.6 |
| Induced Employment | 25.3 | 1.6 |
| Total Employment | 113.9 | 7.2 |
| Multiplier (Total Impact/Direct Impact) | 3.60 | 3.60 |
| Average Earnings per Job (2007 dollars) | $55,267 | $55,267 |
| Note: Direct, indirect, and induced employment impact and average earnings per job are calculated using IMPLAN.<br><br>IMPLAN Impact Analysis for Planning | | |

The analysis of potential changes in tax revenues is based on tax rates of 12.5 percent of taxable value for federal mineral royalties, 6 percent of taxable value for state severance taxes (Wyoming DOR 2001c), and 7.1 percent of taxable value for local ad valorem production taxes. The average estimated local tax rate is based on average tax rates for the planning area counties: Carbon (6.5 percent), Fremont (7.2 percent), Hot Springs (7.1 percent), Natrona (6.6 percent), and Sweetwater (6.6 percent) (Wyoming DOR 2008). Taxable value refers to value of sales minus allowable deductions, including certain costs of production and transportation. For purposes of estimating tax revenues, taxable value was estimated based on the average taxable value per unit sold from the counties in the planning area for production year 2007 using data from Wyoming Department of Revenue (Wyoming DOR 2008). Taxable value was estimated as $58.08 per barrel for oil, and $4.15 per mcf for natural gas (2007 dollars).

# L.4. Livestock Grazing

Economic impacts due to changes in livestock grazing are a function of the amount of forage available and the economic value of the forage. For livestock grazing, long-term surface-disturbing actions from actions listed in Appendix T (p. 1641) could affect the authorized animal unit months (AUMs). In addition, land disposal actions could have economic impacts; however, those impacts were not analyzed quantitatively because it is difficult to predict the net change in AUMs. Subsequent landowners may continue to graze the land, leaving overall livestock production and output in the region unaffected.

The economic analysis of livestock grazing impacts is based on a long-term average (from 1989 to 2008) of actual use as a proportion of permitted use. Based on data from the BLM (BLM 2009a), actual use ranged from 51 percent to 89 percent of active use between 1989 and 2008, with an average value of 73 percent. Whereas permitted AUMs include suspended non-use AUMs, actual use represents the AUMs physically used on the ground in a given year. Actual use therefore accounts for the forage value of the land in a given year, based on climatic conditions (e.g., drought), as well as taking into account the needs of the land and the ranch operators as evidenced by how much of their full authorized amount they utilize.

Whereas reductions in land available for livestock grazing (via long-term surface disturbance or grazing withdrawal) are based on permitted AUMs, financial conditions on a given ranch

operation are determined by actual use (i.e., the actual forage value of the land that is used for livestock) and authorized use (e.g., bank loans that are based on the available forage value of federal leases held by the ranch operator). Thus, actual use is a more appropriate baseline from which to measure reductions in available AUMs due to surface disturbance or restrictions on grazing land. If reductions were measured from a baseline of permitted use, economic impacts would be overstated.

Historical analysis of data from the Lander Field Office shows that actual use in the planning area averaged 73 percent of permitted use from 1989 to 2008 (BLM 2009a). Thus, the economic analysis of livestock grazing impacts uses a baseline of 204,993 AUMs, which represents 73 percent of the permitted use of 280,813 AUMs. Reductions in AUMs due to long-term surface disturbance and grazing restrictions are also adjusted for the ratio of actual to permitted use. The 73 percent ratio is used to estimate AUMs and economic impacts for alternatives A, C, and D. For Alternative B, there would be a substantial reduction in permitted AUMs, occurring gradually over time as BLM adjusts permitted AUMs to comply with rangeland health standards. BLM believes that as these adjustments come into effect, operators would increase their actual use relative to permitted use. Therefore, in Alternative B the actual-to-permitted ratio would be somewhat higher, moving gradually from 73 percent in the first year of analysis to 95 percent in the final year of analysis.

Table L.8, "Estimated AUMs by Alternative" (p. 1591) provides a summary of initial AUMs and total AUMs for each alternative. Based on current allocations of AUMs to cattle, sheep, and other species, 91.6 percent of the AUM reduction, for the purpose of estimating changes in output and employment, is allocated to cattle and the remainder is allocated to sheep. (Approximately one percent of AUMs are allocated to horses, and a handful are allocated to goats; the value of these AUMs is assumed to be approximately equivalent to those for cattle and sheep.) BLM presently authorizes 280,813 AUMs for grazing (BLM 2009a).

Under Alternative A, BLM assumes that the present authorization will be affected only by long-term surface disturbance (i.e., due to other surface uses). Under Alternative B, the assumption is that no new range improvements will be constructed and that grazing management will meet Wyoming Standards for Healthy Rangelands. Allotments that are currently meeting standards will not be adjusted. These assumptions result in a decrease in BLM-authorized AUMs in Alternative B. For example, areas of an allotment greater than two miles from a watering facility would not be included in BLM-authorized AUMs under Alternative B, and the BLM would not build new watering facilities to provide water within two miles of these areas. As a result, areas far from an existing watering facility would not count toward BLM-authorized AUMs in Alternative B. Under Alternative C, the BLM would construct range improvements so as to facilitate the maximum number of AUMs to be available for livestock grazing. These assumptions result in somewhat lower AUMs than Alternative A, but more AUMs than in Alternative B (BLM 2010j, BLM 2011b). Under Alternative D, the BLM would construct range improvements in a fashion similar to that used for Alternative C and would also close some areas to grazing; nonetheless, surface disturbance under Alternative D would be less than that under Alternative C, so that Alternative D would result in a greater number of AUMs available in 2027. For all alternatives, reductions in AUMs over the 20-year planning horizon were modeled in IMPLAN, based on a gradual reduction over the planning timeline, rather than all at once.

**Table L.8. Estimated AUMs by Alternative**

| Item | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| **Permitted AUMs** | | | | |
| Initial AUMs | 280,813 | 280,813 | 280,813 | 280,813 |
| AUMs adjusted to meet rangeland health standards | 0 | 149,364 | 23,432 | 49,696 |
| AUMs lost due to grazing closures | 0 | 1,873 | 0 | 1,043 |
| AUMs lost from long-term surface-disturbing activities | 1,414 | 853 | 6,890 | 1,301 |
| Total AUMs lost (over 20 years) | 1,414 | 152,054 | 30,322 | 51,808 |
| AUMs lost per year, total | 71 | 7,603 | 1,516 | 2,590 |
| Net AUMs in 2027 | 279,399 | 128,759 | 250,491 | 229,005 |
| **Actual AUMs** | | | | |
| Estimated Percentage of Permitted AUMs | 73% | 73 to 95%[1] | 73% | 73% |
| Estimated Actual Use (2008) | 204,993 | 204,993 | 204,993 | 204,993 |
| Estimated Actual Use (2027) | 203,962 | 122,321 | 182,858 | 167,173 |

Source: BLM 2010j, BLM 2011b
[1]In Alternative B, the BLM estimates that actual use relative to permitted AUMs will increase from 73 percent to 95 percent gradually over time.
Note: Acres (e.g., land affected by surface disturbance) were converted to AUMs based on total acres authorized for grazing and AUMs authorized for grazing.

AUM Animal Unit Month
BLM Bureau of Land Management

Due to price fluctuations, average per-AUM values for cattle and sheep are based on the 1998 to 2007 average value of production estimates from the Wyoming Agricultural Statistics Service (Taylor 2010). The value for cattle is $44.81 per AUM and the value for sheep is $43.38 per AUM (in 2007 dollars). Including indirect and induced impacts, the value of one AUM for cattle is $92.58 and for sheep $101.58. Table L.9, "Assumptions for Analysis of Impacts on Output for Livestock Grazing" (p. 1592) shows the economic impact assumptions for cattle and sheep. The direct economic impact is the estimated change in livestock output per AUM; IMPLAN generates the indirect and induced impacts.

**Table L.9. Assumptions for Analysis of Impacts on Output for Livestock Grazing**

| Economic Impact | Cattle | Sheep |
|---|---|---|
| Direct Economic Impact ($/AUM) | $44.81 | $43.38 |
| Indirect Economic Impact ($/AUM)[1] | $35.98 | $42.94 |
| Induced Economic Impact ($/AUM)[2] | $11.76 | $15.61 |
| Total Economic Impact ($/AUM) | $92.55 | $101.92 |
| Multiplier (Total Impact/Direct Impact) | 2.07 | 2.35 |

Note: All dollar values are in 2007 dollars.
[1] Indirect impacts reflect increased demand in sectors that directly or indirectly provide supplies to the livestock industry.
[2] Induced impacts reflect increased demand in the consumer and government sectors.

AUM Animal Unit Month

Table L.10, "Assumptions for Analysis of Employment Impacts for Livestock Grazing" (p. 1592) provides a summary of the employment impacts according to unit changes in livestock AUMs.

**Table L.10. Assumptions for Analysis of Employment Impacts for Livestock Grazing**

| Employment Impact | Cattle | Sheep |
|---|---|---|
| Direct Employment (Jobs/1,000 AUMs) | 0.466 | 0.980 |
| Indirect Employment (Jobs/1,000 AUMs) | 0.215 | 0.529 |
| Induced Employment (Jobs/1,000 AUMs) | 0.125 | 0.174 |
| Total Employment (Jobs/1,000 AUMs) | 0.806 | 1.683 |
| Multiplier (Total Impact/Direct Impact) | 1.73 | 1.72 |
| Average Earnings per Job (2007 dollars) | $33,469 | $17,374 |

Note: Direct, indirect, and induced employment impacts and average earnings per job are calculated using IMPLAN.

AUM Animal Unit Month
IMPLAN Impact Analysis for Planning

# L.5. Recreation

The analysis of economic impacts considers only recreation expenditures of nonresidents of the study area. This is based on the assumption that expenditures of residents would occur in the region regardless of the BLM's actions that impact recreational opportunities; however, changes in nonresident recreation patterns would alter the amount of money entering the local region.

Economic impacts from recreation are a function of recreation visitor days (RVDs) and expenditures per day. Future RVDs were estimated based on current RVDs, recent growth rates, and projected trends. Estimates of future RVDs were based on the professional judgment of BLM staff (BLM 2010k), as well as a United States (U.S.) Forest Service (USFS) study that provides forecasts of recreation activity for the Rocky Mountain region (Bowker et al. 1999). Table L.11, "Estimated Nonresident Recreation Visitor Days" (p. 1593) provides a summary of estimated annual RVDs.

**Table L.11. Estimated Nonresident Recreation Visitor Days**

| Activity | Item | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|---|
| OHV | 2008 RVDs | 1,283 | 1,283 | 1,283 | 1,283 |
| | 2013 RVDs | 1,571 | 1,717 | 1,487 | 1,637 |
| | 2018 RVDs | 1,923 | 2,298 | 1,724 | 2,090 |
| | 2023 RVDs | 2,354 | 3,075 | 1,999 | 2,667 |
| | 2027 RVDs | 2,767 | 3,882 | 2,250 | 3,242 |
| | Average Annual Growth Rate | 4.1% | 6.0% | 3.0% | 5.0% |
| Hunting | 2008 RVDs | 7,900 | 7,900 | 7,900 | 7,900 |
| | 2013 RVDs | 10,627 | 11,608 | 10,627 | 10,083 |
| | 2018 RVDs | 14,295 | 17,056 | 14,295 | 12,868 |
| | 2023 RVDs | 19,230 | 25,060 | 19,230 | 16,424 |
| | 2027 RVDs | 24,378 | 34,094 | 24,378 | 19,963 |
| | Average Annual Growth Rate | 6.1% | 8.0% | 6.1% | 5.0% |
| Fishing | 2008 RVDs | 600 | 600 | 600 | 600 |
| | 2013 RVDs | 774 | 730 | 803 | 842 |
| | 2018 RVDs | 997 | 888 | 1,075 | 1,180 |
| | 2023 RVDs | 1,286 | 1,081 | 1,438 | 1,655 |
| | 2027 RVDs | 1,576 | 1,264 | 1,815 | 2,170 |
| | Average Annual Growth Rate | 5.2% | 4.0% | 6.0% | 7.0% |
| Other Dispersed Recreation | 2008 RVDs | 66,185 | 66,185 | 66,185 | 66,185 |
| | 2013 RVDs | 88,871 | 101,834 | 84,471 | 97,247 |
| | 2018 RVDs | 119,333 | 156,684 | 107,808 | 142,888 |
| | 2023 RVDs | 160,235 | 241,078 | 137,594 | 209,950 |
| | 2027 RVDs | 202,842 | 340,301 | 167,246 | 285,635 |
| | Average Annual Growth Rate | 6.1% | 9.0% | 5.0% | 8.0% |

Source: BLM 2010k

OHV Off-highway vehicle
RVD recreation visitor days

The estimates for average expenditure per visitor day, in 2007 dollars, are $85.72 for fishing (WGFD 2008, USFWS 2008b); $130.34 for hunting (Responsive Management 2004); $52.18 for off-highway vehicle (OHV) use (Foulke et al. 2006), and $57.71 for other dispersed recreation (Stynes and White 2003). Table L.12, "Assumptions for Analysis of Impacts on Output for Recreation Activities" (p. 1594) shows the direct, indirect, and induced output per RVD for each recreation activity, in 2007 dollars.

**Table L.12. Assumptions for Analysis of Impacts on Output for Recreation Activities**

| Economic Impact | OHV (per RVD) | Hunting (per RVD) | Fishing (per RVD) | Other Dispersed (per RVD) |
|---|---|---|---|---|
| Direct Economic Impact[1] | $52.18 | $130.34 | $85.72 | $57.71 |
| Indirect Economic Impact[2] | $7.40 | $31.60 | $11.70 | $8.63 |
| Induced Economic Impact[3] | $6.11 | $22.72 | $11.19 | $7.26 |
| Total Economic Impact | $65.69 | $184.67 | $108.61 | $73.60 |
| Multiplier (total impact/direct impact) | 1.26 | 1.42 | 1.27 | 1.28 |

Sources: WGFD 2008, USFWS 2008b, Responsive Management 2004, Foulke et al. 2006, Stynes and White 2003, Taylor 2010.
Note: Detail may not add to total due to rounding.
[1]Direct economic impact is the average expenditure per visitor day.
[2]Indirect impacts from IMPLAN reflect increased demand in sectors that directly or indirectly provide support for the recreation industry.
[3]Induced impacts from IMPLAN reflect increased demand in the consumer and government sectors.

IMPLAN Impact Analysis for Planning
OHV Off-highway vehicle
RVD recreation visitor day

Table L.13, "Assumptions for Employment Impacts Analysis for Recreation Activities" (p. 1594) provides a summary of employment impacts assumed according to unit changes in RVDs.

**Table L.13. Assumptions for Employment Impacts Analysis for Recreation Activities**

| Employment Impact (annual number of jobs) | OHV (per 1,000 RVDs) | Hunting (per 1,000 RVDs) | Fishing (per 1,000 RVDs) | Other Dispersed (per 1,000 RVDs) |
|---|---|---|---|---|
| Direct Employment | 0.58 | 1.89 | 1.02 | 0.64 |
| Indirect Employment | 0.06 | 0.26 | 0.09 | 0.07 |
| Induced Employment | 0.06 | 0.22 | 0.10 | 0.07 |
| Total Employment | 0.70 | 2.37 | 1.22 | 0.78 |
| Multiplier (Total Impact/Direct Impact) | 1.21 | 1.26 | 1.19 | 1.22 |
| Average Earnings per Job (2007 dollars) | $20,486 | $22,399 | $21,547 | $21,858 |

Note: Direct, indirect, and induced employment impact and average earnings per job are calculated using IMPLAN.

IMPLAN Impact Analysis for Planning
OHV Off-highway vehicle
RVD recreation visitor day

# Appendix M. Wyoming BLM Mitigation Guidelines for Surface-Disturbing and Disruptive Activities

Wyoming Mitigation Guidelines are a compilation of practices employed by the Bureau of Land Management (BLM) to mitigate impacts from surface disturbance. They apply to activities such as road or pipeline construction, range improvements, and permitted recreation activities. The guidelines are designed to protect resources such as soils and vegetation, wildlife habitat, and cultural or historic properties. The guidelines are presented as an appendix of the Resource Management Plan (RMP) and Environmental Impact Statement (EIS) for easy reference as they apply to many resources and derive from many laws. All BLM RMPs have included these guidelines as appendices. Public comment on the guidelines, per se, has not been requested. The guidelines are not land use decisions; rather they are examples of mitigation measures that could be applied, as appropriate, based on site-specific National Environmental Policy Act (NEPA) analysis for individual proposals. Comment on the use and application of specific mitigation measures can be made during the NEPA process for individual proposals. Because mitigation measures change or are modified, based on new information, the guidelines are updated periodically for all field offices in Wyoming.

These guidelines are primarily for the purpose of attaining statewide consistency in how requirements are determined for avoiding and mitigating environmental impacts and resource and land use conflicts. Consistency in this sense does not mean that identical requirements would be applied for all similar types of land use activities that may cause similar types of impacts. Nor does it mean that the requirements or guidelines for a single land use activity would be identical in all areas.

There are two ways the mitigation guidelines are used in the RMP and EIS process: (1) as part of the planning criteria in developing the RMP alternatives; and (2) in the analytical processes of both developing the alternatives and analyzing the impacts of the alternatives. In the first case, an assumption is made that any one or more of the mitigations will be appropriately included as conditions of relevant actions being proposed or considered in each alternative. In the second case, the mitigations are used (1) to develop a baseline for measuring and comparing impacts among the alternatives; (2) to identify other actions and alternatives that should be considered; and (3) to help determine whether more stringent or less stringent mitigations should be considered.

The EIS for the RMP does not decide or dictate the exact wording or inclusion of these guidelines. Rather, the guidelines are used in the RMP and EIS process as a tool to help develop the RMP alternatives and to provide a baseline for comparative impact analysis in arriving at RMP decisions. These guidelines will be used in the same manner in analyzing activity plans and other site-specific proposals. These guidelines and their wording are matters of policy. As such, specific wording is subject to change primarily through administrative review, not through the RMP and EIS process. Any further changes that may be made in the continuing refinement of these guidelines and any development of program-specific standard stipulations will be handled in another forum, including appropriate public involvement and input.

# PURPOSE

The purposes of the "Wyoming BLM Mitigation Guidelines" are (1) to reserve, for the BLM, the right to modify the operations of all surface and other human presence disturbance activities as part of the statutory requirements for environmental protection; and (2) to inform a potential lessee, permittee, or operator of the requirements that must be met when using BLM-administered public lands. These guidelines have been written in a format that will allow for (1) their direct use as stipulations, and (2) the addition of specific or specialized mitigation following the submission of a detailed plan of development or other project proposal and an environmental analysis.

Those resource activities or programs currently without a standardized set of permit or operation stipulations can use the mitigation guidelines as stipulations or as conditions of approval, or as a baseline for developing specific stipulations for a given activity or program.

Because use of the mitigation guidelines was integrated into the RMP and EIS process and will be integrated into the site-specific environmental analysis process, the application of stipulations or mitigation requirements derived through the guidelines will provide more consistency with planning decisions and plan implementation than has occurred in the past. Application of the mitigation guidelines to all surface and other human presence disturbance activities concerning BLM-administered public lands and resources will provide more uniformity in mitigation than has occurred in the past.

# MITIGATION GUIDELINES

## Surface Disturbance Mitigation Guideline

Surface disturbance will be prohibited in any of the following areas or conditions. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the Authorized Officer.

- Slopes in excess of 25 percent
- Within important scenic areas (Visual Resource Management Class I and II areas)
- Within 500 feet of surface water and/or riparian-wetland areas
- Within either ¼ mile or the visual horizon (whichever is closer) of historic trails
- Construction with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur

### *Guidance*

The intent of the surface disturbance mitigation guideline is to inform interested parties (potential lessees, permittees, or operators) that when one or more of the five conditions exist, surface-disturbing activities will be prohibited unless or until a permittee or his designated representative and the surface management agency arrive at an acceptable plan for mitigation of anticipated impacts. This negotiation will occur prior to development.

Specific criteria (e.g., 500 feet from water) have been established based upon the best information available. However, specific geographical areas and seasons must be delineated at the field level. Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of the proposal (e.g., activity plan, plan of development, Plan of

Operation, and Application for Permit to Drill [APD]) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

## Wildlife Mitigation Guideline

A. To protect important big game winter habitat, activities or surface use will not be allowed from November 15 to April 30 within certain areas encompassed by the authorization. The same criteria apply to defined big game birthing areas from May 1 to June 30.

   Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.

   Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.

B. To protect important raptor and/or sage and sharp-tailed grouse nesting habitat, activities or surface use will not be allowed from February 1 to July 31 within certain areas encompassed by the authorization. The same criteria apply to defined raptor and game bird winter concentration areas from November 15 to April 30.

   Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.

   Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.

C. No activities or surface use will be allowed on that portion of the authorization area identified within (legal description) for the purpose of protecting (e.g., sage/sharp-tailed grouse breeding grounds, and/or other species/activities) habitat.

   Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.

D. Portions of the authorized use area legally described as (legal description), are known or suspected to be essential habitat for (name) which is a threatened or endangered species. Prior to conducting any onsite activities, the lessee/permittee will be required to conduct inventories or studies in accordance with BLM and U.S. Fish and Wildlife Service guidelines to verify the presence or absence of this species. In the event that (name) occurrence is identified, the lessee/permittee will be required to modify operational plans to include the protection requirements of this species and its habitat (e.g., seasonal use restrictions, occupancy limitations, facility design modifications).

### *Guidance*

The Wildlife Mitigation Guideline is intended to provide two basic types of protection: seasonal restriction and prohibition of activities or surface use (2c). Item 2d is specific to situations involving threatened or endangered species. Legal descriptions will ultimately be required and should be measurable and legally definable. There are no minimum subdivision requirements at this time. The area delineated can and should be defined as necessary, based upon current biological data, prior to the time of processing an application and issuing the use authorization. The legal description must eventually become a part of the condition for approval of the permit, plan of development, and/or other use authorization.

The seasonal restriction section identifies three example groups of species and delineates three similar timeframe restrictions. The big game species including elk, moose, deer, pronghorn, and bighorn sheep, all require protection of crucial winter range between November 15 and April 30. Elk and bighorn sheep also require protection from disturbance from May 1 to June 30, when they typically occupy distinct calving and lambing areas. Raptors include eagles, accipiters, falcons (peregrine, prairie, and merlin), buteos (ferruginous and Swainson's hawks), osprey, and burrowing owls. The raptors and sage and sharp-tailed grouse require nesting protection between February 1 and July 31. The same birds often require protection from disturbance from November 15 through April 30 while they occupy winter concentration areas.

Item 2c, the prohibition of activity or surface use, is intended for protection of specific wildlife habitat areas or values within the use area that cannot be protected by using seasonal restrictions. These areas or values must be factors that limit life-cycle activities (e.g., sage-grouse strutting grounds, known threatened and endangered species habitat).

Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of the proposal (e.g., activity plan, plan of development, Plan of Operation, APD) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

## Cultural Resource Mitigation Guideline

When a proposed discretionary land use has potential for affecting the characteristics which qualify a cultural property for the National Register of Historic Places (NRHP), mitigation will be considered. In accordance with Section 106 of the Historic Preservation Act, procedures specified in 36 Code of Federal Regulations (CFR) 800 will be used in consultation with the Wyoming State Historic Preservation Officer and the Advisory Council on Historic Preservation in arriving at determinations regarding the need and type of mitigation to be required.

### *Guidance*

The preferred strategy for treating potential adverse effects on cultural properties is "avoidance." If avoidance involves project relocation, the new project area may also require cultural resource inventory. If avoidance is imprudent or unfeasible, appropriate mitigation may include excavation (data recovery), stabilization, monitoring, protection barriers and signs, or other physical and administrative measures.

Reports documenting results of cultural resource inventory, evaluation, and the establishment of mitigation alternatives (if necessary) shall be written according to standards contained in BLM Manuals, the cultural resource permit stipulations, and in other policy issued by the BLM. These reports must provide sufficient information for Section 106 consultation. Reports shall be reviewed for adequacy by the appropriate BLM cultural resource specialist. If cultural properties on, or eligible for, the NRHP are located within these areas of potential impact and cannot be avoided, the Authorized Officer shall begin the Section 106 consultation process in accordance with the procedures contained in 36 CFR 800.

Mitigation measures shall be implemented according to the mitigation plan approved by the BLM Authorized Officer. Such plans are usually prepared by the land use applicant according to BLM specifications. Mitigation plans will be reviewed as part of Section 106 consultation for NRHP eligible or listed properties. The extent and nature of recommended mitigation shall be commensurate with the significance of the cultural resource involved and the anticipated extent of

damage. Reasonable costs for mitigation will be borne by the land use applicant. Mitigation must be cost effective and realistic. It must consider project requirements and limitations, input from concerned parties, and be BLM approved or BLM formulated.

Mitigation of paleontological and natural history sites will be treated on a case-by-case basis. Factors such as site significance, economics, safety, and project urgency must be taken into account when making a decision to mitigate. Authority to protect (through mitigation) such values is provided for in the Federal Land Policy and Management Act, Section 102(a)(8). When avoidance is not possible, appropriate mitigation may include excavation (data recovery), stabilization, monitoring, protection barriers and signs, or other physical and administrative protection measures.

## Special Resource Mitigation Guideline

To protect (resource value), activities or surface use will not be allowed (i.e., within a specific distance of the resource value or between date to date) in (legal description).

Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.

Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.

Example Resource Categories (Select or identify category and specific resource value):

a. Recreation areas

b. Special natural history or paleontological features

c. Special management areas

d. Sections of major rivers

e. Prior existing rights-of-way

f. Occupied dwellings

g. Other (specify)

***Guidance***

The *Special Resource Mitigation Guideline* is intended for use only in site-specific situations where one of the first three general mitigation guidelines will not adequately address the concern. The resource value, location, and specific restrictions must be clearly identified. A detailed plan addressing specific mitigation and special restrictions will be required prior to disturbance or development and will become a condition for approval of the permit, plan of development, or other use authorization.

Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of proposals (e.g., activity plans, plans of development, plans of operation, APD) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

## No Surface Occupancy Guideline

No Surface Occupancy (NSO) will be allowed on the following described lands (legal description) because of (resource value).

Example Resource Categories (Select or identify category and specific resource value):

a. Recreation Areas (e.g., campgrounds, historic trails, national monuments)

b. Major reservoirs/dams

c. Special management area (e.g., known threatened or endangered species habitat, areas suitable for consideration for wild and scenic rivers designation)

d. Other (specify)

***Guidance***

The *No Surface Occupancy Mitigation Guideline* is intended for use only when other mitigation is determined insufficient to adequately protect the public interest and is the only alternative to "no development" or "no leasing." The legal description and resource value of concern must be identified and be tied to an NSO land use planning decision.

Waiver of, or exception(s) to, the NSO requirement will be subject to the same test used to initially justify its imposition. If, upon evaluation of a site-specific proposal, it is found that less restrictive mitigation would adequately protect the public interest or value of concern, then a waiver or exception to the NSO requirement is possible. The record must show that because conditions or uses have changed, less restrictive requirements will protect the public interest. An environmental analysis must be conducted and documented (e.g., environmental assessment, EIS, etc., as necessary) in order to provide the basis for a waiver or exception to an NSO planning decision. Modification of the NSO requirement will pertain only to refinement or correction of the location(s) to which it applied. If the waiver, exception, or modification is found to be consistent with the intent of the planning decision, it may be granted. If found inconsistent with the intent of the planning decision, a plan amendment would be required before the waiver, exception, or modification could be granted.

When considering the "no development" or "no leasing" option, a rigorous test must be met and fully documented in the record. This test must be based upon stringent standards described in the land use planning document. Since rejection of all development rights is more severe than the most restrictive mitigation requirement, the record must show that consideration was given to development subject to reasonable mitigation, including "no surface occupancy." The record must also show that other mitigation was determined to be insufficient to adequately protect the public interest. A "no development" or "no leasing" decision should not be made solely because it appears that conventional methods of development would be unfeasible, especially where an NSO restriction may be acceptable to a potential permittee. In such cases, the potential permittee should have the opportunity to decide whether or not to go ahead with the proposal (or accept the use authorization), recognizing that an NSO restriction is involved.

# Appendix N. Standard Oil and Gas Stipulations

Operations will not be approved which, in the opinion of the Authorized Officer, would unreasonably interfere with the orderly development and/or production from a valid existing mineral lease issued prior to this one for the same lands.

## Lease Notice 1

Under Regulation 43 Code of Federal Regulations (CFR) 3101.1 2 and terms of the lease (Bureau of Land Management [BLM] Form 3100 11), the Authorized Officer may require reasonable measures to minimize adverse impacts to other resource values, land uses, and users not addressed in lease stipulations at the time operations are proposed. Such reasonable measures may include, but are not limited to, modification of siting or design of facilities, timing of operations, and specification of interim and final reclamation measures, which may require relocating proposed operations up to 200 meters, but not off the leasehold, and prohibiting surface disturbance activities for up to 60 days.

The lands within this lease may include areas not specifically addressed by lease stipulations that may contain special values, may be needed for special purposes, or may require special attention to prevent damage to surface and/or other resources. Possible special areas are identified below. Any surface use or occupancy within such special areas will be strictly controlled or, if absolutely necessary, prohibited. Appropriate modifications to imposed restrictions will be made for the maintenance and operation of producing wells.

1. Slopes in excess of 25 percent
2. Within 500 feet of surface water and/or riparian-wetland areas
3. Construction with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur
4. Within 500 feet of Interstate highways and 200 feet of other existing rights of way (i.e., United States [U.S.] and state highways, roads, railroads, pipelines, powerlines)
5. Within ¼ mile of occupied dwellings
6. Material sites

***Guidance***

The intent of this notice is to inform interested parties (potential lessees, permittees, operators) that when one or more of the above conditions exist, surface-disturbing activities will be prohibited unless or until the permittee or the designated representative and the surface management agency arrive at an acceptable plan for mitigation of anticipated impacts. This negotiation will occur prior to development and become a condition for approval when authorizing the action.

Specific threshold criteria (e.g., 500 feet from water) have been established based upon the best information available. However, geographical areas and time periods of concern must be delineated at the field level (i.e., “surface water and/or riparian-wetland areas” may include both intermittent and ephemeral water sources or may be limited to perennial surface water).

The referenced oil and gas leases on these lands are hereby made subject to the stipulation that the exploration or drilling activities will not interfere materially with the use of the area as a materials site/free use permit. At the time operations on the above lands are commenced, notification will be made to the appropriate agency. The name of the appropriate agency may be obtained from the proper BLM Field Office.

## Lease Notice 2

### *Background*

The BLM, by including National Historic Trails (NHTs) within its National Landscape Conservation System, has recognized these trails as national treasures. Our responsibility is to review the strategy for management, protection, and preservation of these trails. The NHTs in Wyoming, which include the Oregon, California, Mormon Pioneer, and Pony Express Trails, as well as the Nez Perce Trail, were designated by Congress through the National Trails System Act (Public Law [P.L.] 90-543; 16 United States Code [U.S.C.] 1241-1251) as amended through P.L. 106-509 dated November 13, 2000. Protection of the NHTs is normally considered under the National Historic Preservation Act (NHPA) (P.L. 89-665; 16 U.S.C. 470 et seq.) as amended through 1992 and the National Trails System Act. Additionally, Executive Order 13195, "Trails for America in the 21st Century," signed January 18, 2001, states in Section 1: "Federal agencies will ... protect, connect, promote, and assist trails of all types throughout the U.S. This will be accomplished by … (b) Protecting the trail corridors associated with national scenic trails and the high priority potential sites and segments of NHTs to the degrees necessary to ensure that the values for which each trail was established remain intact." Therefore, the BLM will be considering all impacts and intrusions to the NHTs, their associated historic landscapes, and all associated features, such as trail traces, grave sites, historic encampments, inscriptions, natural features frequently commented on by emigrants in journals, letters and diaries, or any other feature contributing to the historic significance of the trails. Additional NHTs will likely be designated amending the National Trails System Act. When these amendments occur, this notice will apply to those newly designated NHTs as well.

### *Strategy*

The BLM will proceed in this objective by conducting a viewshed analysis on either side of the designated centerline of the NHTs in Wyoming, except, at this time, for the Nez Perce Trail, for the purpose of identifying and evaluating potential impacts to the trails, their associated historic landscapes, and their associated historic features. Subject to the viewshed analysis and archeological inventory, reasonable mitigation measures may be applied. These may include, but are not limited to, modification of siting or design of facilities to camouflage or otherwise hide the proposed operations within the viewshed. Additionally, specification of interim and final reclamation measures may require relocating the proposed operations within the leasehold. Surface-disturbing activities will be analyzed in accordance with the National Environmental Policy Act of 1969 (P.L. 91-190; 42 U.S.C. 4321-4347) as amended through P.L. 94-52, July 3, 1975 and P.L. 94-83, August 9, 1975, and the NHPA, supra, to determine if any design, siting, timing, or reclamation requirements are necessary. This strategy is necessary until the BLM determines that, based on the results of the completed viewshed analysis and archeological inventory, the existing land use plans (Resource Management Plans) have to be amended.

The use of this lease notice is a predecisional action, necessary until final decisions regarding surface-disturbing restrictions are made. Final decisions regarding surface-disturbing restrictions

will take place with full public disclosure and public involvement over the next several years if BLM determines that it is necessary to amend existing land use plans.

### *Guidance*

The intent of this notice is to inform interested parties (potential lessees, permittees, operators) that when any oil and gas lease contains remnants of NHTs, or is located within the viewshed of an NHT's designated centerline, surface-disturbing activities will require the lessee, permittee, operator or, their designated representative, and the surface management agency to arrive at an acceptable plan for mitigation of anticipated impacts. This negotiation will occur prior to development and become a condition for approval when authorizing the action.

## Attachment to Each Lease

### *Notice to Lessee*

Provisions of the Mineral Leasing Act (MLA) of 1920, as amended by the Federal Coal Leasing Amendments Act of 1976, affect an entity's qualifications to obtain an oil and gas lease. Section 2(a)(2)(A) of the MLA, 30 U.S.C. 201 (a)(2)(A), requires that any entity that holds and has held a federal coal lease for 10 years beginning on or after August 4, 1976, and who is not producing coal in commercial quantities from each such lease, cannot qualify for the issuance of any other lease granted under the MLA. Compliance by coal lessees with Section 2(a)(2)(A) is explained in 43 CFR 3472.

In accordance with the terms of this oil and gas lease, with respect to compliance by the initial lessee with qualifications concerning federal coal lease holdings, all assignees and transferees are hereby notified that this oil and gas lease is subject to cancellation if: (1) the initial lessee as assignor or as transferor has falsely certified compliance with Section 2(a)(2)(A), or (2) because of a denial or disapproval by a State Office of a pending coal action, i.e., arms-length assignment, relinquishment, or logical mining unit, the initial lessee as assignor or as transferor is no longer in compliance with Section 2(a)(2)(A). The assignee, sublessee or transferee does not qualify as a bona fide purchaser and, thus, has no rights to bona fide purchaser protection in the event of cancellation of this lease due to noncompliance with Section 2(a)(2)(A).

Information regarding assignor, sublessor or transferor compliance with Section 2(a)(2)(A) is contained in the lease case file as well as in other BLM records available through the State Office issuing this lease.

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# Appendix O. Fire Management

Table O.1, “Fire Management by Fire Management Unit” (p. 1606) provides a description of fire management by Fire Management Units within the planning area.

## Table O.1. Fire Management by Fire Management Unit

| FMU | Suppression Objectives | Use of Wildland Fire and Prescribed Fire | Non-Fire Fuels Treatments Objectives | Post-Fire Rehabilitation and/or Restoration Objectives | Community Protection/ Community Assistance | Prescribed Fire/Non-Fire Fuels Treatments | Restoration and Rehabilitation |
|---|---|---|---|---|---|---|---|
| **Green and Crooks Mountain FMU** | Firefighter and public safety, protection of communities, development and improvements, and protection of resources (e.g., cultural, wildlife habitat, watersheds, etc.). | Use prescribed fire treatments to create a vegetative mosaic and maintain natural openings in the mountain shrub habitat within the FMU. Emphasis on the mountain shrub communities (mountain sagebrush, bitterbrush, snowberry, buckbrush and other associated shrubs) and marginal timbered communities, including areas where there is declining health of aspen stands. | Multi-year stated treatments will be utilized to revitalize aspen stands and to improve and maintain forest health in conifer-timbered communities. | Post-fire rehabilitation and restoration of wildfires will be initiated to allow reestablishment of native plant communities and to stabilize erosive soil conditions on a case-by-case basis. | Coordinate fuels reduction plans and actions with private land and homeowners to significantly reduce the likelihood of landscape-level fire within the WUI and thereby enhance public safety. | Initiate prescribed burning in the next 10 years on approximately 1,500 acres within mountain shrub and marginal timber communities to improve wildlife habitat, create opening in vegetation communities with conifer encroachment, restore aspen stands that are decadent and in declining health, and reduce hazardous fuels. A portion of the 1,500 acres may also be treated with mechanical, manual chemical, or biological methods. | Restoration and rehabilitation will emphasize the reestablishment of habitat diversity and ecosystem health on a case-by-case basis. Site-specific projects will be considered to meet the objectives as identified in the Resource Management Plan. |
| **Sweetwater Valley FMU** | Firefighter and public safety, protection of communities, development and improvements, and protection of resources (e.g., cultural, wildlife | Allow fire use to protect, maintain, and enhance resources, and as nearly as possible, be allowed to function in its natural ecological role. Use of | Chemical and various methods of mechanical treatments are planned within this FMU over the next 10 years to improve sagebrush-grassland health | Post-fire rehabilitation and restoration of wildlands fires would be initiated, if necessary, to protect and sustain ecosystems, public health, safety, and | There are no identified communities at risk in this FMU. | Initiate prescribed burning on approximately 20,000 acres of sagebrush-grassland and marginal timbered communities in the next 10 years | Post-fire rehabilitation and restoration of wildfires would be initiated, if necessary, to protect and sustain ecosystems, public health, |

| FMU | Suppression Objectives | Use of Wildland Fire and Prescribed Fire | Non-Fire Fuels Treatments Objectives | Post-Fire Rehabilitation and/or Restoration Objectives | Community Protection/ Community Assistance | Prescribed Fire/Non-Fire Fuels Treatments | Restoration and Rehabilitation |
|---|---|---|---|---|---|---|---|
| | habitat, watersheds, etc.). | prescribed fire is desired to reintroduce fire into the ecosystem. Create and maintain a vegetative mosaic across the landscape. Air quality objectives would be met. | and to allow greater water infiltration into the soil. | to help communities protect infrastructure. | | to reduce fuels and encourage restoration of ecosystem health. A portion of the 20,000 acres may also be treated with mechanical, manual chemical, or biological methods. | safety, and to help communities protect infrastructure. |
| **Rattlesnake Hills FMU** | Firefighter and public safety, protection of communities, development and improvements, and protection of resources (e.g., cultural, wildlife habitat, watersheds, etc.). | Allow fire use to protect, maintain, and enhance resources, and as nearly as possible, be allowed to function in its natural ecological role. Use of prescribed fire is desired to reintroduce fire into the ecosystem. Create and maintain a vegetative mosaic across the landscape. Air quality objectives would be met. | Chemical and various methods of mechanical treatments will be considered, as needed, by a site-specific plan to create uneven aged vegetative mosaics within sagebrush-grasslands and to improve diversity of herbaceous species and regeneration of decadent aspen stands. | Evaluate the need for rehabilitation or restoration work following disturbances focusing on immediate reestablishment of native vegetation species suited to local range sites. | There are no identified communities at risk (as listed on the Federal Register) in this FMU. Work closely with homeowners, ranchers, and communities in the FMU to develop and implement hazardous fuels reduction projects on public lands adjacent to private lands and structures at risk in the event of a landscape-level wildland fire. | Initiate prescribed burning on approximately 12,000 acres of sagebrush-grassland communities (primarily improvement of mountain shrub habitat and restoration of aspen stands) over the next 10 years to reduce fuels and encourage restoration of ecosystem health. A portion of the 12,000 acres may also be treated with mechanical, manual chemical, or biological methods. | Projects will be identified on an as-needed basis to reestablish native vegetation species. |

| FMU | Suppression Objectives | Use of Wildland Fire and Prescribed Fire | Non-Fire Fuels Treatments Objectives | Post-Fire Rehabilitation and/or Restoration Objectives | Community Protection/ Community Assistance | Prescribed Fire/Non-Fire Fuels Treatments | Restoration and Rehabilitation |
|---|---|---|---|---|---|---|---|
| **Lander Slope FMU** | Firefighter and public safety, protection of communities, development and improvements, and protection of resources (e.g., cultural, wildlife habitat, watersheds, etc.). | Use prescribed fire to reintroduce fire into the ecosystem. Use prescribed fire treatments to create a vegetative mosaic and limit the extent of conifer encroachment into sagebrush/ mountain shrub communities, and rejuvenate older aspen stand and promote aspen regeneration. Use prescribed fire in the form of pile burning to reduce the hazardous fuel buildup created by thinning near communities and subdivisions and also created by cutting conifers of vegetative communities. Air quality objectives would be met. | Chemical and various methods of mechanical treatments will be considered, as needed, by a site-specific plan to create uneven aged vegetative mosaics. | Evaluate the need for rehabilitation or restoration work following disturbances focusing on immediate reestablishment of native vegetation species suited to local range sites. | Reduce fire risk to WUI communities. Develop risk assessment and mitigation plans for public and private lands. | Initiate prescribed burning on approximately 2,500 acres for hazardous fuels reduction, aspen regeneration, restoration of ecosystem health in mountain shrub habitat (mountain sagebrush, bitterbrush, serviceberry and other associated shrubs), and burning of slab piles produced from mechanical vegetation treatments over the next 10 years to reduce fuels and encourage restoration of ecosystem health. A portion of the 2,500 acres may also be treated with mechanical, manual chemical, or biological methods. | Projects will be identified on an as-needed basis to reestablish native vegetation species. |

| FMU | Suppression Objectives | Use of Wildland Fire and Prescribed Fire | Non-Fire Fuels Treatments Objectives | Post-Fire Rehabilitation and/or Restoration Objectives | Community Protection/ Community Assistance | Prescribed Fire/Non-Fire Fuels Treatments | Restoration and Rehabilitation |
|---|---|---|---|---|---|---|---|
| **Copper Mountain FMU** | Firefighter and public safety, protection of communities, development and improvements, and protection of resources (e.g., cultural, wildlife habitat, watersheds, etc.). | Allow fire use to protect, maintain, and enhance resources, and as nearly as possible be allowed to function in its natural ecological role. Use of prescribed fire is desired to reintroduce fire into the ecosystem. Create and maintain a vegetative mosaic and limit the extent of conifer encroachment into sagebrush/ mountain shrub communities. Air quality objectives would be met. | Chemical and various methods of mechanical treatments will be considered, as needed, by a site-specific plan to create uneven aged vegetative mosaics. | Evaluate the need for rehabilitation or restoration work following disturbances focusing on immediate reestablishment of native vegetation species suited to local range sites. | Currently, there are no identified communities at risk in this FMU (as listed in the Federal Register). | Initiate prescribed burning on approximately 5,600 acres over the next 10 years of mountain sagebrush-grassland communities to treat sagebrush steppe with juniper encroachment, hazardous fuels reduction and aspen regeneration. A portion of the 5,600 acres may also be treated with mechanical, manual chemical, or biological methods. | Post-fire rehabilitation and restoration of wildfires would be initiated, if necessary, to protect and sustain ecosystems, public health, safety and to help communities protect infrastructure. |
| **Dubois FMU** | Firefighter and public safety, protection of communities, development and improvements, and protection of resources (e.g., cultural, wildlife habitat, watersheds, etc.). | Create and maintain a vegetative mosaic across the landscape. Emphasis on the mountain shrub communities and marginal timbered communities, including area where there is declining health of aspen stands. | Multi-year staged treatments will be utilized to revitalize aspen stands, rejuvenate shrub communities, and to improve and maintain forest health. | Depending upon the size and intensity of the burn, post-fire rehabilitation and restoration of wildfires will be initiated to allow reestablishment of native plant communities and to stabilize erosive soil conditions. | Coordinate fuels reduction plans and actions with Dubois and Union Pass communities to significantly reduce the likelihood of landscape-level fire within the WUI and to lower the risk of danger to public safety. Develop risk assessment and fire defense plan for | Initiate prescribed burning on approximately 2,400 acres over the next 10 years of mountain shrub and marginal timber communities for hazardous fuels reduction as well as restoring ecosystem health (aspen regeneration, treating areas | Post-fire rehabilitation and restoration of wildfires would be initiated, if necessary, to protect and sustain ecosystems, public health, safety, and to help communities protect infrastructure. |

| FMU | Suppression Objectives | Use of Wildland Fire and Prescribed Fire | Non-Fire Fuels Treatments Objectives | Post-Fire Rehabilitation and/or Restoration Objectives | Community Protection/ Community Assistance | Prescribed Fire/Non-Fire Fuels Treatments | Restoration and Rehabilitation |
|---|---|---|---|---|---|---|---|
| | | | | | public lands in the Dubois WUI area. | of conifer encroachment and wildlife habitat improvement) and burning slash piles produced by mechanical operations and timber harvest. A portion of the 2,400 acres may also be treated with mechanical, manual chemical, or biological methods. | |

FMU Fire Management Unit
WUI Wildland-Urban Interface

# Appendix P. Species Mentioned in the Lander Field Office Resource Management Plan and Environmental Impact Statement

**Table P.1. Common and Scientific Names of Plant and Wildlife Species**

| Common Name | Scientific Name |
|---|---|
| **Plants** | |
| Alder | *Alnus serrulata* |
| Arrowleaf balsamroot | *Balsamorhiza sagittata* |
| Aspen | *Populus tremuloides* |
| Barneby's clover | *Trifolium barnebyi* |
| Basin big sagebrush | *Artemisia tridentata ssp. tridentata* |
| Beaver Rim phlox | *Phlox pungens* |
| Big sagebrush | *Artemisia tridentata* Nutt. |
| Bitterbrush | *Purshia tridentata* |
| Black henbane | *Hyoscyamus niger* |
| Blowout penstemon | *Penstemon haydenii* |
| Bluebunch wheatgrass | *Pseudoroegneria spicata* |
| Bluegrass | *Poa annua* |
| Bottlebrush squirreltail | *Elymus elymoides* |
| Boxelder | *Acer negundo* |
| Bud sagebrush | *Picrothamnus desertorum* |
| Buffalobur | *Solanum rostratum* |
| Bull thistle | *Cirsium vulgare* |
| Canada thistle | *Cirsium arvense* |
| Cedar Rim thistle | *Cirsium aridum* |
| Cheatgrass | *Bromus tectorum* |
| Cinquefoil | *Potentilla* |
| Common burdock | *Arctium minus (Hill) Bernh.* |
| Common St. Johnswort | *Hypericum perforatum* |
| Common tansy | *Tanacetum vulgare* |
| Cottonwood | *Populus spp.* |
| Curlycup gumweed | *Grindelia squarrosa* |
| Dalmatian toadflax | *Linaria genistifolia ssp. dalmatica* |
| Dandelion | *Taraxacum officinale* |
| Desert yellowhead | *Yermo xanthocephalus* |
| Diffuse knapweed | *Centaurea diffusa* |
| Douglas-fir | *Pseudotsuga menziesii* |
| Dubois milkvetch | *Astragalus gilviflorus var. purpureus* |
| Dwarf mistletoe | *Arceuthobium spp.* |
| Dyers woad | *Isatis tinctoria* |
| Engelmann spruce | *Picea engelmannii* |
| Field bindweed | *Convolvulus arvensis* |
| Foxtail barley | *Hordeum jubatum* |
| Fremont bladderpod | *Lesquerella fremontii* |
| Gardner's saltbush | *Atriplex gardneri* |
| Greasewood | *Sarcobatus vermiculatus* |
| Great Basin wild rye | *Leymus cinereus* |
| Green needlegrass | *Nassella viridula* |
| Halogeton | *Halogeton glomeratus* |

| Common Name | Scientific Name |
|---|---|
| Hoary cress (whitetop) | *Cardaria draba and Cardaria pubescens Desv.* |
| Houndstongue | *Cynoglossum offinale* |
| Idaho fescue | *Festuca idahoensis* |
| Indian ricegrass | *Achnatherum hymenoides* |
| Lady's bedstraw | *Galium verum* |
| Larkspur | *Delphinium occidentale* |
| Leafy spurge | *Euphorbia esula* |
| Limber pine | *Pinus flexilis* |
| Lodgepole pine | *Pinus contorta* |
| Mat muhly | *Muhlenbergia richardsonis* |
| Meadow pussytoes | *Antennaria arcuata* |
| Mountain brome | *Bromus marginatus* |
| Mountain mahogany | *Cercocarpus kunth* |
| Mountain big sagebrush | *Artemisia tridentata ssp. vaseyana* |
| Mountain thermopsis | *Thermopis montana* |
| Musk thistle | *Carduus nutans* |
| Mustard | *Brassicaceae spp.* |
| Needle grass | *Achnatherum* |
| Owl Creek miner's candle | *Cryptantha subcapitata* |
| Ox-eye daisy | *Leucanthemum vulgare or Chrysanthemum leucanthemum* |
| Perennial pepperweed (giant whitetop) | *Lepidium latifolium* |
| Perennial sowthistle | *Sonchus arvensis* |
| Persistent sepal yellowcress | *Rorippa calycina* |
| Plains larkspur / Geyer larkspur | *Delphinium geyeri* |
| Plains prickly pear | *Opuntia polyacantha* |
| Plumeless thistle | *Carduus acanthoides* |
| Poplar bud-gall mite | *Eriophes parapopuli* |
| Porter's sagebrush | *Artemisia porteri* |
| Prairie junegrass | *Koeleria macrantha* |
| Puncturevine | *Tribulus terrestris* |
| Purple loosestrife | *Lythrum salicaria* |
| Quackgrass | *Agropyron repens* |
| Rocky Mountain juniper | *Juniperus scopulorum* |
| Rocky Mountain twinpod | *Physaria saximontana var. saximontana* |
| Russian knapweed | *Acroptilon repens (synonym = Centaurea repens)* |
| Russian olive | *Elaeagnus angustifolia* |
| Russian thistle | *Salsola tragus* |
| Sagebrush | *Artemisia spp.* |
| Salt cedar | *Tamarix spp.* |
| Sandberg bluegrass | *Poa secunda* |
| Scotch thistle | *Onopordum acanthium* |
| Showy milkweed | *Asclepias speciosa* |
| Silver sage | *Salvia argentea* |
| Skeletonleaf bursage | *Franseria discolor Nutt.* |
| Snowberry | *Symphoricarpos albus* |
| Spotted knapweed | *Centaurea maculosa* |
| Sulfur cinquefoil | *Potentilla recta* |
| Swainsonpea | *Sphaerophysa salsula* |
| Thickspike wheatgrass | *Elymus lanceolatus* |
| Threadleaf sedge | *Carex filifolia* |
| Utah juniper | *Juniperus osteosperma* |
| Ute ladies'-tresses | *Spiranthes diluvialis* |
| Water birch | *Betula occidentalis* |

| Common Name | Scientific Name |
|---|---|
| Whitebark pine | *Pinus albicaulis* |
| Wild licorice | *Glycyrrhiaz lepidota* |
| Willow | *Salix spp.* |
| Wyeth lupine | *Lupinus wyethii* |
| Wyoming big sagebrush | *Artemisia tridentata ssp. wyomingensis* |
| Yellow toadflax | *Linaria vulgaris* |
| **Fungi** | |
| Blister rust or white pine blister rust | *Cronartium ribicola* |
| **Fish** | |
| Black bullhead | *Ameirus melas* |
| Black crappie | *Pomoxis nigromaculatus* |
| Bluegill | *Lepomis macrochirus* |
| Bonneville cutthroat trout | *Onocorhynchus clarki utah* |
| Brook trout | *Salvelinus fontinalis* |
| Brown trout | *Salmo trutta* |
| Burbot | *Lota lota* |
| Channel catfish | *Ictalurus punctatus* |
| Common carp [Carp in text] | *Cyprinus carpio* |
| Creek chub | *Semotilus atromaculatus* |
| Cutthroat trout | *Oncorhynchus clarki* |
| Emerald shiner | *Notropis atherinoides* |
| Fathead minnow | *Pimephales promelas* |
| Flathead chub | *Platygobio gracilis* |
| Golden shiner | *Notemigonus crysoleucas* |
| Green sunfish (green sunfish - bluegill hybrid) | *Lepomus cyanellus* |
| Iowa darter | *Etheostoma exile* |
| Johnny darter | *Etheostoma nigrum* |
| Lake chub | *Couesius plumbeus* |
| Lake trout | *Salvelinus namaycush* |
| Largemouth bass | *Micropterus salmoides* |
| Longnose dace | *Rhinichthys cataractae* |
| Longnose sucker | *Catostomus catostomus* |
| Mottled Sculpin | *Cottus bairdi* |
| Mountain sucker | *Catostomus platyrhynchus* |
| Mountain whitefish | *Prosopium williamsoni* |
| Pallid sturgeon | *Scaphirhynchus albus* |
| Plains killifish | *Fundulus zebrinus* |
| Rainbow trout | *Oncorhynchus mykiss* |
| River carpsucker | *Carpiodes carpio* |
| Sand shiner | *Notropis stramineus* |
| Sauger | *Sander canadensis* |
| Shorthead redhorse | *Moxostoma macrolepidotum* |
| Snake River cutthroat | *Oncorhynchus clarki spp.* |
| Splake (brook and lake trout hybrid) | *Salvelinus namaycush X Salvelinus fontinalis* |
| Spottail shiner | *Notropis hudsonius* |
| Stonecat | *Noturus flavus* |
| Walleye | *Sander vitreus* |
| White crappie | *Pomoxis annularis* |
| White sucker | *Catostomus commersoni* |
| Yellow perch | *Perca flavescens* |
| Yellowstone cutthroat trout | *Oncorhynchus clarki bouvieri* |
| **Wildlife** | |
| American kestrel | *Falco sparverius* |

| Common Name | Scientific Name |
|---|---|
| Badger | *Taxidea taxus* |
| Baird's sparrow | *Ammodramus bairdii* |
| Bald eagle | *Haliaeetus leucocephalus* |
| Barn owl | *Tyto alba* |
| Beaver | *Castor canadensisis* |
| Bighorn sheep | *Ovis canadensis* |
| Bison | *Bison bison* |
| Black bear | *Ursus americanus* |
| Black-footed ferret | *Mustela nigripes* |
| Bobcat | *Lynx rufus* |
| Boreal chorus frog | *Pseudacris maculata* |
| Boreal owl | *Aegolius funereus* |
| Boreal toad (Rocky Mountain population) | *Anaxyrus boreas boreas* |
| Brewer's sparrow | *Spizella breweri* |
| Bullsnake | *Pituophis catenifer sayi* |
| Burrowing owl | *Athene cunicularia* |
| Canada lynx | *Lynx canadensis* |
| Chukar partridge | *Alectoris chukar* |
| Columbia spotted frog | *Rana luteiventris* |
| Cooper's hawk | *Accipiter cooperii* |
| Coot | *Fulica spp.* |
| Cottontail rabbit | *Sylvilagus spp.* |
| Coyote | *Canis latrans* |
| Ducks and geese | *family Anatidae* |
| Dusky grouse | *Dendragapus obscurus* |
| Dwarf shrew | *Sorex nanus* |
| Eastern yellow-bellied racer | *Coluber constrictor flaviventris* |
| Elk | *Cervus elaphus* |
| Ferruginous hawk | *Buteo regalis* |
| Golden eagle | *Aquila chrysaetos* |
| Gray partridge | *Perdix perdix* |
| Gray wolf | *Canis lupus* |
| Great Basin spadefoot toad | *Scaphiopus intermontana* |
| Great gray owl | *Strix nebulosa* |
| Great horned owl | *Bubo virginianus* |
| Greater sage-grouse | *Centrocercus urophasianus* |
| Greater short-horned lizard | *Phrynosoma (Tapaja) hernandesi* |
| Grizzly bear | *Ursus arctos horribilis* |
| Ground squirrel | *Spermophilus sp.* |
| Jackrabbit | *Lepus* |
| Loggerhead shrike | *Lanius ludovicianus* |
| Long-billed curlew | *Numenius americanus* |
| Long-eared myotis | *Myotis evotis* |
| Long-eared owl | *Asio otus* |
| Marten | *Martes sp.* |
| Merlin | *Falco columbarius* |
| Mink | *Mustela vison* |
| Moose | *Alces alces* |
| Mountain bluebird | *Sialia currucoides* |
| Mountain lion | *Puma concolor* |
| Mountain plover | *Charadrius montanus* |
| Mourning dove | *Zenaida macroura* |
| Mouse | *Peromyscus spp.* |

| Common Name | Scientific Name |
|---|---|
| Mule deer | *Odocoileus hermionus* |
| Muskrat | *Ondata zibethicus* |
| North American wolverine | *Gulogulo luscus* |
| Northern goshawk | *Accipiter gentilis* |
| Northern harrier | *Circus cyaneus* |
| Northern leopard frog | *Lithobates pipiens* |
| Northern pygmy owl | *Glaucidium californicum* |
| Northern sagebrush lizard | *Sceloporus graciosus graciosus* |
| Northern saw-whet owl | *Aegolius acadicus* |
| Osprey | *Pandion haliaetus* |
| Peregrine falcon | *Falco peregrinus* |
| Pheasant | *Phasianus colchicus* |
| Prairie rattlesnake | *Crotalus viridis* |
| Plains spadefoot toad | *Spea bombifrons* |
| Porcupine | *Hystricomorph hystricidae* |
| Prairie dogs | *Cynomys spp.* |
| Prairie falcon | *Falco mexicanus* |
| Pronghorn | *Antilocapra americana* |
| Pygmy rabbit | *Brachylagus idahoensis* |
| Raccoon | *Procyon lotor* |
| Rail | *family Rallidae* |
| Rat | *Rattus spp.* |
| Red fox | *Vulpes vulpes* |
| Red squirrel | *Tamiasciurus hudsonicus* |
| Red-tailed hawk | *Buteo jamaicensis* |
| Rough-legged hawk | *Buteo lagopus* |
| Ruffed grouse | *Bonasa umbellus* |
| Sage sparrow | *Amphispiza belli* |
| Sage thrasher | *Oreoscoptes montanus* |
| Sandhill crane | *Grus canadensis* |
| Sharp-shinned hawk | *Accipiter striatus* |
| Short-eared owl | *Asio flammeus* |
| Shrew | *family Soricidae* |
| Skunk | *family Mephitidae* |
| Snipe | *Gallinago sp.* |
| Snowshoe hare | *Lepus americanus* |
| Spotted bat | *Euderma maculatum* |
| Swainson's hawk | *Buteo swainsoni* |
| Swift fox | *Vulpes velox* |
| Tiger salamander | *Ambystoma mavortium* |
| Townsend's big-eared bat | *Corynorhinus townsendii* |
| Trumpeter swan | *Cygnus buccinator* |
| Turkey vulture | *Cathartes aura* |
| Vesper sparrow | *Pooecetes gramineus* |
| Vole | *Microtus sp.* |
| Wandering gartersnake | *Thamnophis elegans vagrans* |
| Weasel | *Mustela spp.* |
| Western screech owl | *Megascops kennicottii* |
| White-faced ibis | *Plegadis chihi* |
| White-tailed deer | *Odocoileus virginianus* |
| White-tailed prairie dog | *Cynomys leucurus* |
| Yellow-billed cuckoo | *Coccyzum americanus* |
| **Invertebrates** | |

| Common Name | Scientific Name |
|---|---|
| Army cutworm | *Euxos auxilliarius* |
| Aphthona flea beetle | *Aphthona nigriscutis* |
| Beet leafhopper | *Circulifer tenellus* |
| Didymo | *Didymosphenia geminata* |
| Grasshopper | *suborder Caelifera; order Orthoptera* |
| Mormon cricket | *Anabrus simplex* |
| Mosquito | *Culicidae spp.* |
| Mosquito | *Culex tarsalis* |
| Mountain pine beetle | *Dendroctonus ponderosae* |
| New Zealand mud snail | *Potamopyrgus antipodarum* |
| Poplar bud-gall mite | *Eriophes parapopuli* |
| Quagga mussel | *Dreissena rostriformis* |
| Zebra mussel | *Dreissena polymorpha* |

# Appendix Q. Fire Regime and Vegetation Condition

This appendix provides an overview of Fire Regime Groups and descriptions, fire regime condition classifications, and a general description of the condition of corresponding vegetation types.

**Table Q.1. Fire Regime Groups and Descriptions**

| Group | Frequency | Severity | Severity Description |
|---|---|---|---|
| I | 0-35 years | Low/mixed | Generally low-severity fires replacing less than 75 percent of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75 percent of the overstory |
| II | 0-35 years | Replacement | High-severity fires replacing greater than 75 percent of the dominant overstory vegetation |
| III | 35-200 years | Mixed/low | Generally mixed-severity; can also include low-severity fires |
| IV | 35-200 years | Replacement | High-severity fires |
| V | 200+ years | Replacement/any severity | Generally replacement-severity; can include any severity type in this frequency range |
| Source: DOI and The Nature Conservancy 2008 | | | |

**Table Q.2. Fire Regime Condition Classifications**

| Condition Class | Severity Description |
|---|---|
| 1 | For the most part, fire regimes in this fire condition class are within historical ranges. Vegetation composition and structure are intact. Therefore, the risk of losing key ecosystem components from the occurrence of fire remains relatively low. |
| 2 | Fire regimes on these lands have been moderately altered from their historical range by either increased or decreased fire frequency. A moderate risk of losing key ecosystem components has been identified on these lands. |
| 3 | Fire regimes on these lands have been substantially altered from their historical return interval. The risk of losing key ecosystem components from fire is high. Fire frequencies have departed from historical ranges by multiple return intervals. Vegetation composition, structure, and diversity have been substantially altered. |
| Source: DOI and The Nature Conservancy 2008 | |

The tables below are an estimate of vegetative conditions based on data from Existing Vegetation, Fire Regimes, and Fire Regime Condition Class (FRCC) from regional LANDFIRE data on biophysical settings (BpS model), as well as estimates from on the ground conditions. The BpS model describes the vegetation, geography, biophysical characteristics, succession stage, disturbance regime, and assumptions. It is designed to accompany the quantitative state and transition models.

**Table Q.3. Forest and Woodland Fire Regime Groups, Fire Regime Condition Classifications, and Vegetation Structure and Health in the Planning Area**

| Vegetation Type | FRCC Description | Fire Regime Group | Landscape Level FRCC | Vegetation Structure and Health |
|---|---|---|---|---|
| Forest (inclusive of major forest types; lodgepole pine and Douglas-fir) | Stand replacement fires dominate FRG IV. The FRCC for the forested communities is displaying indicators of moderate departure from reference conditions and is within the timeline where stand replacement fire would return the communities to a vegetative state dominated by perennial grass and forbs with tree seedlings. Some of these indicators include insect and disease outbreaks and fuel loading associated with a mature forest stand. Some areas of the planning area that point within the timeline may have been altered by changes in the fuel loading by logging and fuels reduction activities, as well as historic fire suppression. | IV | 2 | ***Lodgepole Pine Structure:*** Mid-development with mid-open to closed canopy, 21 to 100 percent moderate to dense pole-sized trees sometimes very dense (dog hair) trees.<br><br>Health: Fire regime of replacement severity – high (35-100 years). Very dense tree stands are more susceptible to disease and insect infestations.<br><br>***Douglas-Fir Structure:*** Mid-development closed to open canopy, canopy closure is 10 percent to greater than 35 percent, with small trees to late development with large trees with mixed understory of grass and scattered shrubs. Some stands of Douglas-fir showing old growth characteristics are specific areas.<br><br>Health: Fire Regime of replacement severity – (35-100 years) high number of trees per acre more susceptible to disease and insect infestations. |
| Woodlands (inclusive of major woodland types; juniper, aspen and limber pine) | The majority of woodlands fall within FRG IV with isolated woodland stands in rock outcrops falling within FRG V. FRCC 2 is indicative of the woodland communities having moderate departure from reference conditions. Indicators for this FRCC include encroachment of conifers into mature to decadent aspen stands and encroachment of juniper and limber pine out from historic rocky and shallow-soiled sites into shrub habitat. | IV and V | 2 | ***Juniper Structure:*** Mid-development open class, canopy 21-40 percent, and trees established usually short and widely spaced.<br><br>Health: Fire frequency 35-100+ years. This class last until trees are approximately 100 years old then succeeds to vegetative class with trees greater than 100 years of age.<br><br>***Aspen Structure:*** Mid-development closed canopy 41-100 percent; dense, pole six trees in this class. Succession to different class after 50 years. Less forb and shrub cover in understory.<br><br>Health: Succession to different class after 50 years. Less forb and shrub cover in understory in this class.<br><br>***Limber Pine Structure:*** Mid development open canopy 21-40 percent; trees established usually short and widely spaced. |

| Vegetation Type | FRCC Description | Fire Regime Group | Landscape Level FRCC | Vegetation Structure and Health |
|---|---|---|---|---|
| | | | | *Health:* Fire frequency 35-100+ years. This class last until trees are approximately 100 years old then succeeds to vegetative class with trees greater than 100 years of age. |

Source: LANDFIRE 2010
FRG Fire Regime Group
FRCC Fire Regime Condition Class

**Table Q.4. Grasslands and Shrubland Fire Regime Groups, Fire Regime Condition Classifications, and Vegetation Structure and Health in the Planning Area**

| Vegetation Type | Dominant Fire Regime Group | Estimated Landscape Level FRCC | FRCC Description | Vegetation Structure and Health |
|---|---|---|---|---|
| Grasslands | I | FRCC 1: 34 percent<br><br>FRCC 2: 26 percent<br><br>FRCC 3: 41 percent | Grasslands within the Lander Field Office would historically have experienced fire return interval of 25 years across the landscape. These areas have an altered fuel loading due to a combination of factors including historic and current livestock grazing, human infrastructure and fire suppression. Fire frequency within this vegetative type is far less than would have occurred historically, though the potential loss of key ecosystem components is minimal. Vegetation composition and structure has been significantly altered in FRCC 3 areas. | ***FRCC 1 Structure:*** Early development class – shrub cover minimal or non-existent, bare ground 10-30 percent, vegetative canopy 0-30 percent (forb cover 10-40 percent, grasses 60-90 percent), maintains vegetation in early development, mixed-severity fire (0-37 years) does not change successional age.<br><br>*Health:* Replacement fire frequency 75 years. Forb density and cover responsive to climatic conditions, in rare flood events (500-year). Moves vegetation to more shrubby condition mid-development, closed after down cutting.<br><br>***FRCC 2 Structure:*** Mid-development open to closed class – mostly stable and resilient system with moderate canopy closure, total canopy cover 25-80 percent (grasses greater than 85 percent, forbs 0-5 percent, shrubs 0-10 percent).<br><br>*Health:* Replacement fire frequency of 75 years, causes transition back to early development class; recurring drought would thin vegetation and keep canopy open.<br><br>***FRCC 3 Structure:*** Late development open to closed class – closed canopy of grasses forbs and shrubs; total cover greater than 85 percent (grasses 25-50 percent, forbs 0-5 percent, shrubs 10-75 percent, 10 percent in transition to shrub or tree dominated communities), mixed fire 35 years moving to mid-development class.<br><br>*Health:* Replacement fire frequency 75 years. Extended drought would cause transition back to mid-development class with thinning of shrubs; flooding every 100 years would cause transition to early development class. |
| Sagebrush Shrublands | IV | FRCC 1: 16 percent<br><br>FRCC 2: 48 percent<br><br>FRCC 3: 35 percent | Sagebrush shrublands within the Lander Field Office are generally dominated by mature to decadent sagebrush with a secondary component of grass. Depending upon their location within | ***FRCC 1 Structure:*** Early development Sagebrush cover 0-15 percent (area depending if basin big sagebrush, Wyoming big sagebrush and/or mountain big sagebrush), generally grass dominated with herbaceous cover 30-50 percent, fire frequency 0-35 years.<br><br>*Health:* Early development class-replacement fire occurs 150-200 years; little to no effect by insect or disease. |

| Vegetation Type | Dominant Fire Regime Group | Estimated Landscape Level FRCC | FRCC Description | Vegetation Structure and Health |
|---|---|---|---|---|
| | | | the Lander Field Office, these sites would have historically carried fire with variable burnt patch size. A combination of factors including historic and current livestock grazing, human infrastructure and fire suppression have altered the natural disturbance regime within the sagebrush shrublands found in the Lander Field Office. Key ecosystem components are still present, though vegetation composition and structure has been significantly altered in FRCC 3 areas. | ***FRCC 2 Structure:*** Mid-development open sagebrush cover 15-30 percent (area depending if basin big sagebrush, Wyoming big sagebrush and/or mountain big sagebrush), generally becoming shrub dominated, herbaceous cover 10-20 percent, fire frequency same and FRCC 1.<br><br>Health: Same year span on replacement fire however some occurrence of insect or disease impact.<br><br>***FRCC 3 Structure:*** Late development (open and closed). Sagebrush cover greater than 25-80 percent (area depending if basin big sagebrush, Wyoming big sagebrush and/or mountain big sagebrush). Generally shrub dominated with mature and over mature with suppressed understory; herbaceous cover 10 percent; replacement fire occurs every 80-100 years.<br><br>Health: 35-100+ year frequency replacement; replacement fire may cause transition to early development class. Insects and disease occur. |
| Greasewood and Salt Desert Shrub | IV | Unspecified, needs to be split from Sagebrush Shrublands. Estimated to be dominated by FRCC 1 across landscape. | Fire was very infrequent in this vegetative type. Fire Return Intervals are estimated to be 200 years. | ***Greasewood Structure:*** Vegetative cover 0-20 percent and/or 21-50 percent; some grasses with greasewood sprouts and rabbitbrush present in early development. In late development open class – greasewood shrubs maturing or have reached maturity and would increase canopy closure; perennial grasses still in understory.<br><br>Health: Wet periods contribute to mortality; susceptible to invasion of nonnative grasses (cheatgrass).<br><br>***Salt Desert Shrub Structure:*** Early development class is only class for the vegetative type – vegetative cover is 0-20 percent; shrubland composed of Gardener's and mat saltbush with some winterfat, scattered forbs, and grasses.<br><br>Health: Wet periods contribute to mortality; susceptible to invasion of nonnative grasses (cheatgrass). |

| Vegetation Type | Dominant Fire Regime Group | Estimated Landscape Level FRCC | FRCC Description | Vegetation Structure and Health |
|---|---|---|---|---|
| Mountain Shrub | IV | Unspecified, needs to be split from Sagebrush Shrublands. Estimated to be dominated by FRCC 2 across landscape. | These vegetative communities are dominated by mature to decadent shrub. Though these communities are generally in condition class 2, all of the ecological components are present. | ***Structure:*** In mid to late development class dominant shrubs are (dependent on primary shrub): sagebrush 15-30 percent; shrub cover with curlleaf mountain mahogany, bitterbrush, snowberry and rabbitbrush, and mature sagebrush co-dominant, 30-40 percent; grasses and forbs may be present in gaps between shrubs.<br><br>*Health:* Replacement fire frequency is 80-150 years. Insect and disease may occur; weather-related mortality every 200 years would transition to early development. |

Source: LANDFIRE 2010

Vegetative structure in each vegetative class incorporates biophysical setting models for Map Zone 22; Inter-Mountain Basins Curl-leaf Mountain Mahogany woodland, Inter-mountain Basins Mat Saltbush shrubland, Wyoming Basins Dwarf Sagebrush shrubland and steppe, Inter-Mountains Basins Big Sagebrush shrubland-Basin Big Sagebrush, Inter-Mountain Basins Big Sagebrush shrubland-Wyoming Big Sagebrush, Inter-Mountain Basin Montane Sagebrush steppe, Inter-Mountain Basins Semi-Desert Shrub Steppe, Inter-Mountains Basins Semi-desert Grassland, Northern Rocky Mountain Lower Montane-Foothill-valley grassland, and Inter-Mountains Basins Greasewood Flat.

FRG Fire Regime Group
FRCC Fire Regime Condition Class

# Appendix R. Lands Identified for Land Tenure Adjustment(s)

The Bureau of Land Management's (BLM) land tenure program (that is, the acquisition or disposal of land) is designed to: (1) improve management of natural resources through consolidation of federal, state, and private lands; (2) increase recreational opportunities and preserve open space; (3) secure key property necessary to protect endangered species and promote biological diversity; (4) preserve archeological and historical resources; (5) implement specific acquisitions authorized by Acts of Congress; and (6) allow for expansion of communities and consolidation of non-federal land ownership. Alternative A carries forward all of the lands identified for land tenure adjustment or disposal that were identified in the 1987 Resource Management Plan (RMP). Alternatives B, C, and D identify fewer acres for disposal, based on values that were not considered in 1987 or on other issues such as changed land ownership patterns. The lands that were part of the 1987 decision (including ones not carried forward by alternatives B, C, and D) are listed in Appendix S (p. 1629) and displayed in Maps 94 and 95.

Site-specific environmental review and documentation in conformance with the National Environmental Policy Act, including completion of categorical exclusions and plan conformance determinations where appropriate, will be accomplished for each proposed land program action. Interdisciplinary impact analysis will be tiered within the framework of this and other applicable environmental documents. Future shifts in policy and national priorities could result in modifications of these provisions and changes in addressing priority lands actions; the current emphasis on greater sage-grouse is an example of a policy shift that has impacted the land tenure program. Land tenure adjustments must serve the public interest.

The following are some criteria that will be considered in land tenure adjustment proposals, but they are not considered all inclusive. These criteria are meant to guide and streamline consideration of land tenure adjustment proposals.

- Important, crucial, or critical habitat for fish, wildlife, and plants;
- Riparian-wetland areas and designated floodplains;
- Parcels that provide access to larger blocks of public land;
- Lands with special designation or management emphasis, or areas found to meet the relevance and importance criteria for Area of Critical Environmental Concern (ACEC) management;
- Significant cultural resources, especially within the Congressionally Designated Trails corridors;
- Recreation opportunities and benefits;
- Visual Resource Management Class I and Class II areas;
- Lands that will improve greater sage-grouse habitat, contain leks, or would facilitate greater sage-grouse management.

Members of the public and others identified additional parcels that were not identified in the 1987 RMP for the BLM to consider for disposal or exchange. These properties are described below and depicted on Map 141.

**Lands near Big Atlantic Gulch Campground: T. 27 N., R. 90 W.,**

Sec. 34: S2N2, S2, SESW.

These lands are in the South Pass Historic Mining Area ACEC and in the northeast part of the Atlantic City common grazing allotment. Recreation is the major focus in the area, with high seasonal use of the campground (tourists and campers in the summer and hunters in the fall months). Although the campground is not staffed in the winter, the area is frequently visited for cross-country skiing, snowshoeing, and snowmobiles.

**Lands near the National Historic Trails: T. 28 N., R. 99 W.,**

Sec. 19: N2NE4, NE4NW4.

**Lands near the Burnt Ranch: T. 28 N., R. 100 W.,**

Sec. 17: SESW;

20: NENW;

23: SE4SE4;

24: S2NE4, NW4SW4, S2SE4;

25: NE4NW4, SW4NW4.

These lands contain many culturally important artifacts and a portion of the main branch of the Oregon National Historic Trail. These lands are part of the Atlantic City Upper Fenced allotment.

**T. 29 N., R. 101 W.,**

Sec. 13: W2SW, SWSE.

Located to the north and east of Atlantic City, these lands are part of the Silver Creek grazing allotment and partially in the National Historic Trails ACEC. Strawberry Creek joins the Sweetwater River adjacent to these lands. The area has a number of old mining operations and many other cultural properties. Recreation is the primary use of the land.

**T. 29 N., R. 91 W.,**

Sec. 6: E2SE, SWSE, SENW;

7: E2SW, SWSE;

18: NENW.

These parcels are associated with retired uranium mill sites, which have been segregated from land use laws in preparation for withdrawal and transfer to the U.S. Department of Energy.

**T. 29 N., R. 92 W.,**

Sec. 1: S2NE, SW, W2SE, SESE;

2: NESW, S2SW, SE;

3: SESE;

11: All;

12: All;

13:N2;

14: NE, NENW.

These parcels are associated with retired uranium mill sites, which have been segregated from land use laws in preparation for withdrawal and transfer to the U.S. Department of Energy.

**T. 29 N., R. 96 W.,**

Sec. 7: SWNW, NWSW.

**T. 29 N., R. 97 W.,**

Sec. 1: SWSW;

2: SE;

3: N2N2, SWNE, SWNW;

4: N2, SWSW, N2SE;

5: N2NE, W2SW, SESW, SWSE;

6: W2NW, S2;

7: SENE, N2NW, SWNW, SE;

8: All;

9: N2, N2S2, SWSW;

10: N2;

11: N2, NESE;

12: All;

17: NE, W2, NWSE;

18: All.

**T. 29 N., R. 98 W.,**

Sec. 12: E2NE, NESE;

13: All;

14: SENE, E2SE.

**T. 30 N., R. 97 W.,**

Sec. 21: E2SE;

22: SW, W2SE, SESE;

26: SWNW, W2SW;

27: All Except SWSW;

28: N2NE, SENE, SWNW, W2SW, SESW, SWSE;

29: S2N2, NWNW, S2;

30: NENE, SW4, S2SE;

31: All;

32: All;

33: NWNE, S2NE, NW, S2;

34: All Except NWNW;

35: W2W2, SENW, E2SW, W2SE.

**T. 33 N., R. 89 W.,**

Sec. 9: SE;

21: NE.

These parcels are associated with retired uranium mill sites, which have been segregated from land use laws in preparation for withdrawal and transfer to the U.S. Department of Energy.

**T. 33 N., R. 90 W.,**

Sec. 9: NESE;

10: NW, W2SE;

15: S2NE, NWNE, N2SE, SESE;

21: E2NE, NESE;

22: NENE.

These parcels are associated with retired uranium mill sites, which have been segregated from land use laws in preparation for withdrawal and transfer to the U.S. Department of Energy.

**T. 33 N., R. 98 W.,**

Sec. 8: NENE;

17: W2SW;

18: E2E2, SWSE;

19: All Except NWNW;

20: W2.

**T. 33 N., R. 99 W.,**

Sec. 24: SENE;

25: NWSW; S2SW;

26: SENE.

The lands in T. 33 N., R. 98 and 99 W. are in a portion of blocked lands with public access from Johnny Behind the Rocks from the south, and from the Coal Mine Road to the north. These lands are southwest of Hudson, Wyoming, and are part of a common grazing allotment. The lands are used for recreation as well as grazing. The lands are within greater sage-grouse Core Area and comprise deer and pronghorn habitat.

**T. 33 N., R. 100 W.,**

Sec. 5: NWNE, NW, N2SW.

**T. 34 N., R. 90 W.,**

Sec. 22: N2N2, S2NE, SENW, S2SW, NESE.

**T. 34 N., R. 100 W.,**

Sec. 32: SWNW, W2SW, SESW, SWSE.

These lands are located west of Lander, Wyoming, with Red Butte to the south and the North Fork Road to the north. They contain important wildlife habitat and open space in an area that has experienced significant residential development.

**T. 36 N., R. 91 W.,**

Sec. 24; All;

25; All;

35. All.

**T. 36 N., R. 92 W.,**

Sec. 22: S2S2;

23: S2S2.

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# Appendix S. Lands Identified for Disposal

In Table S.1, "Lands Identified for Disposal" (p. 1630), the Lander Field Office Resource Management Plan (RMP) specifically identifies areas available for consideration for disposal by employing the "isolated, difficult or expensive to manage, or needed-for community expansion" disposal criteria in the Federal Land Policy and Management Act (FLPMA). The areas below were identified during development of the new RMP as complying with FLPMA disposal criteria. Inclusion in Table S.1, "Lands Identified for Disposal" (p. 1630), does not constitute a decision that the land will be disposed. Before taking any disposal action, consideration will be given to each individual tract and will include public involvement. As stated elsewhere in the RMP, the preferred method of disposal or acquisition of lands is through exchanges. Proposals for disposal of lands not identified in Table S.1, "Lands Identified for Disposal" (p. 1630), will be considered if they are consistent with the objectives of the approved RMP and could require a land use plan amendment.

FLPMA provides for retention of the public lands in federal ownership and management by the Bureau of Land Management (BLM) for multiple uses. FLPMA and other federal laws, executive orders, and policies suggest criteria to use when categorizing public lands for retention or disposal, and for identifying acquisition priorities. Disposal by sale, exchange, airport grant, or Recreation and Public Purposes patent remains an option if such an action would serve an important objective and have a public benefit.

Site-specific environmental review and documentation in conformance with the National Environmental Policy Act, including completion of categorical exclusions and plan conformance determinations where appropriate, will be accomplished for each proposed land program action. Interdisciplinary impact analysis will be tiered within the framework of this and other applicable environmental documents. Many of the foregoing provisions of this appendix are based on current policy. Future shifts in policy and national priorities could result in modifications of these provisions and changes in addressing priority lands actions. Land tenure adjustments must serve the public interest.

The following are suggested criteria to consider in land tenure adjustment proposals, but the list is not considered all inclusive. These criteria are meant to guide and streamline consideration of land tenure adjustment proposals. Acquisition of lands will be considered, if in compliance with the RMP, to facilitate various resource management objectives and to acquire lands with high resource values including, but not limited to:

- Important, crucial, or critical habitat for fish, wildlife, and plants, particularly if located in greater sage-grouse Core Area or in an Area of Critical Environmental Concern with relevant and important wildlife values
- Riparian-wetland areas, and designated floodplains
- Parcels that provide access to blocks of public land
- Lands with or adjacent to special designation or management emphasis
- Significant cultural resources
- Recreation opportunities and benefits
- Visual Resource Management Class I and Class II areas

The preferred method for acquisition will be through exchange. Acquisitions, including easements, can be completed through exchange, Land and Water Conservation Fund purchases, or donations. Acquisitions of private lands will be pursued only with willing landowners.

## Table S.1. Lands Identified for Disposal

| Parcel No. | Legal Description | Identified for Disposal in Alternatives: |
|---|---|---|
| 1 | T. 43 N., R. 108 W.,<br>Sec. 27: SW¼NW¼, NW¼SW¼<br>80 ac. | All alternatives |
| 5 | T. 42 N., R. 108 W.,<br>Sec. 21: S½NE¼<br>80 ac. | All alternatives |
| 7 | T. 43 N., R. 108 W.,<br>Sec. 35: NE¼SW¼<br>40 ac. | All alternatives |
| 8 | T. 42 N., R. 108 W.,<br>Sec. 2: E2SE¼<br>80 ac. | All alternatives |
| 11 | T. 42 N., R. 107 W.,<br>Sec. 18: S½NW¼, SW¼<br>240 ac. | All alternatives |
| 14 | T. 42 N., R. 107 W.,<br>Sec. 17: S½SW¼<br>20: NW¼, NE¼SW¼<br>280 ac. | All alternatives |
| 20 | T. 41 N., R. 107 W.,<br>Sec. 13: N½NW¼, SW¼NW¼<br>24: NE¼NE¼<br>160 ac. | Alternatives A and D |
| 21 | T. 41 N., R. 106 W.,<br>Sec. 7: SW¼ SW¼<br>18: N½NW¼<br>T. 41 N., R. 107 W.,<br>Sec. 13: SE¼NE¼, E ½SE¼<br>160 ac. | All alternatives |
| 24 | T. 43 N., R. 105 W.,<br>Sec. 32: W½NW¼<br>80 ac. | All alternatives |

| Parcel No. | Legal Description | Identified for Disposal in Alternatives: |
|---|---|---|
| 25 | T. 43 N., R. 105 W.,<br>Sec. 33: E½E½, W½NE¼<br>34: W½W½<br>400 ac. | All alternatives |
| 26 | T. 42 N., R. 105 W.,<br>Sec. 4: Lots 3, 4 (N½NW¼)<br>S½NW¼<br>Sec. 5: SE¼NE¼<br>200.7 ac. | All alternatives |
| 27 | T. 42 N., R. 105 W.,<br>Sec. 3: S½SE¼<br>10: NE¼, SE¼NW¼<br>280 ac. | All alternatives |
| 28 | T. 42 N., R. 105 W.,<br>Sec. 9: SW¼SE¼<br>40 ac. | Alternative D with restrictions |
| 31 | T. 41 N., R. 105 W.,<br>Sec. 12: Lot 2(NE¼SE¼)<br>24 ac. | Alternative D with restrictions |
| 34 | T. 41 N., R. 105 W.,<br>Sec. 8: NW¼NW¼, NW¼SE¼<br>80 ac. | All alternatives |
| 38 | T. 40 N., R. 106 W.,<br>Sec. 22: SE¼NE¼, S½<br>360 ac. | Alternative D with restrictions |
| 40 | T. 33 N., R. 101 W.,<br>Sec. 2: NE ¼SW¼<br>40 ac. | All alternatives |
| 44 | T. 33 N., R. 100 W.,<br>Sec. 7: Lots 3, 4 SE¼SW¼, SW¼SE¼<br>161 ac. | All alternatives |

| Parcel No. | Legal Description | Identified for Disposal in Alternatives: |
|---|---|---|
| 45 | T. 33 N., R. 100 W.,<br>Sec. 8: SW¼SE¼,<br>40 ac. | All alternatives |
| 46 | T. 33 N., R. 100 W.,<br>Sec. 17: NW¼NW¼,<br>40 ac. | All alternatives |
| 48 | T. 33 N., R. 100 W.,<br>Sec. 28: E½SE¼<br>80 ac. | All alternatives |
| 49 | T. 33 N., R. 100 W.,<br>Sec. 23: W½SW¼,<br>80 ac. | Alternative A |
| 53 | T. 33 N., R. 99 W.,<br>Sec. 1: SE¼SW¼<br>Sec. 11: E½NE¼, NE¼SE¼<br>Sec. 12: W½NW¼, NW¼SW¼<br>280 ac. | All alternatives |
| 54 | T. 33 N., R. 99 W.,<br>Sec. 25: W½SW¼, SE¼SW¼<br>Sec. 26: SE¼NE¼<br>160 ac. | Alternative D with restrictions |
| 56 | T. 32 N., R. 99 W.,<br>Sec. 17: SE¼NW¼<br>40 ac. | All alternatives |
| 59 | T. 32 N., R. 100 W.,<br>Sec. 27: SW¼NW¼, NW¼SW¼<br>Sec. 28: S½NE¼, NE¼SE¼<br>Sec 33: NW¼NE¼<br>320 ac. | All alternatives |
| 62 | T. 32 N., R. 99 W.,<br>Sec. 30: SE¼NE¼<br>40 ac. | All alternatives |

| Parcel No. | Legal Description | Identified for Disposal in Alternatives: |
|---|---|---|
| 63 | T. 32N.,R 99Wl,<br>Sec. 28: W½W½<br>29: SW¼SW¼<br>280 ac. | All alternatives |
| 64 | T. 32 N., R. 99 W.,<br>Sec. 32: S½NE¼, N½SE¼, SE¼SE¼<br>Sec. 33: SW¼SW¼<br>200 ac. | All alternatives |
| 66 | T. 31 N., R. 98 W.,<br>Sec. 5: Lot 4, SE¼NW¼<br>80.86 ac. | All alternatives |
| 67 | T. 31 N., R. 98 W.,<br>Sec. 21: SE¼NE¼<br>40 ac. | Alternatives A and D |
| 68 | T. 30 N., R. 98 W.,<br>Sec. 7: NE¼SE¼<br>18: SE¼NE¼, NE¼NW¼<br>120 ac. | Alternatives A and D |
| 69 | T. 30 N., R. 98 W.,<br>Sec. 12: S½NE¼, SE¼NW¼<br>N½N½<br>280 ac. | Alternatives A and D |
| 71 | T. 29 N., R. 100 W.,<br>Sec. 25: NE¼<br>160 ac. | Alternatives A and D |
| 72 | T. 29 N., R. 98 W.,<br>Sec. 7: Lot 5<br>37.57 ac. | All alternatives |
| 73 | T. 29 N., R. 98 W.,<br>Sec. 10: SE¼SW¼, SW¼SE¼<br>15: NE¼NE¼<br>120 ac. | All alternatives |

| Parcel No. | Legal Description | Identified for Disposal in Alternatives: |
|---|---|---|
| 74 | T. 29 N., R. 98 W.,<br>Sec. 11: SW¼NE¼, S½NW¼<br>120 ac. | All alternatives |
| 75 | T. 29 N., R. 98 W.,<br>Sec. 1: SW¼SW¼<br>12: W½NW¼, NW¼SW¼<br>160 Ac. | All alternatives |
| 79 | T. 31 N., R. 97 W.,<br>Sec. 12: SE¼SE¼<br>40 ac. | All alternatives |
| 80 | T. 31 N., R. 96 W.,<br>Sec. 18: SW¼SE¼<br>19: N½NE¼, SW¼NE¼<br>160 ac. | All alternatives |
| 81 | T. 31 N., R. 96 W.,<br>Sec. 20: SE¼SW¼, S½SE¼<br>29: NE¼NW¼, N½NE¼<br>28: W½NW¼<br>320 ac. | All alternatives |
| 82 | T. 31 N., R. 96 W.,<br>Sec. 21: SE¼SE¼<br>22: SW¼SW¼<br>80 ac. | All alternatives |
| 83 | T. 31 N., R. 96 W.,<br>Sec. 27: SW¼SW¼<br>34: NW¼NE¼, NE¼NW¼<br>120 ac. | All alternatives |
| 84 | T. 31 N., R. 96 W.,<br>Sec. 33: E½SE¼<br>80 ac. | All alternatives |
| 85 | T. 31 N., R. 96 W.,<br>Sec. 35: N½SW¼<br>80 ac. | Alternatives A and D |

| Parcel No. | Legal Description | Identified for Disposal in Alternatives: |
|---|---|---|
| 86 | T. 40 N., R. 94 W.,<br>Sec. 11: NE¼NW¼<br>40 ac. | All alternatives |
| 87 | T. 40 N., R. 94 W.,<br>Sec. 12: SE¼NE¼, NE¼SE¼<br>T. 39 N., R. 93 W.,<br>Sec. 7: SW¼NW¼<br>120 ac. | All alternatives |
| 88 | T. 40 N., R. 93 W.,<br>Sec. 5: SE¼NE¼<br>40 ac. | All alternatives |
| 89 | T. 40 N., R. 93 W.,<br>Sec. 3: SW¼SW¼<br>40 ac. | All alternatives |
| 90 | T. 40 N., R. 92 W.,<br>Sec. 6: Lot 5<br>T. 40 N., R. 93 W.,<br>Sec. 1: NW¼SE¼, NE¼SW¼<br>128.15 ac. | All alternatives |
| 91 | T. 40 N., R. 93 W.,<br>Sec. 14: SW¼NW¼<br>15: NE¼SE¼<br>80 ac. | All alternatives |
| 92 | T. 40 N., R. 91 W.,<br>Sec. 19: NW¼SE¼<br>20: NW¼SW¼<br>80 ac. | All alternatives |
| 93 | T. 40 N., R. 92 W.,<br>Sec. 11: S½SE¼<br>80 ac. | All alternatives |
| 96 | T. 40 N., R. 91 W.,<br>Sec. 5: NE¼NW¼ (Lot 3)<br>45.83 ac. | All alternatives |

| Parcel No. | Legal Description | Identified for Disposal in Alternatives: |
|---|---|---|
| 97 | T. 40 N., R. 91 W.,<br>Sec. 8: N½NE¼, SW¼NE¼<br>120 ac. | All alternatives |
| 98 | T. 40 N., R. 91 W.,<br>Sec. 9: NE¼NW¼<br>40 ac. | Alternatives A and D |
| 99 | T. 40 N., R. 91 W.,<br>Sec. 10: SW¼NW¼<br>40 ac. | All alternatives |
| 101 | T. 40 N., R. 91 W.,<br>Sec. 3: Lots 1, 2<br>91.88 ac. | All alternatives |
| 105 | T. 40 N., R. 89 W.,<br>Sec. 9; N½NE¼<br>80 ac. | All alternatives |
| 106 | T. 39 N., R. 91 W.,<br>Sec. 24: NW¼SE¼<br>40 ac. | All alternatives |
| 108 | T. 39 N., R. 89 W.,<br>Sec. 8: E½NW¼<br>80 ac. | All alternatives |
| 109 | T. 39 N., R. 89 W.,<br>Sec. 8: NE¼SE¼<br>40 ac. | All alternatives |
| 110 | T. 39 N., R. 89 W.,<br>Sec. 8: SW¼SW¼<br>17: NW¼NW¼<br>18: NE¼NE¼<br>120 ac. | All alternatives |
| 112 | T. 38 N., R. 94 W.,<br>Sec. 11: SW¼SW¼<br>14: W½NW¼<br>120 ac. | All alternatives |

| Parcel No. | Legal Description | Identified for Disposal in Alternatives: |
|---|---|---|
| 118 | T. 37 N., R. 89 W.,<br>Sec. 28: NW¼NW¼<br>29: N½N½, SW¼NE¼,<br>S½NW¼<br>320 ac. | All alternatives |
| 119 | T. 35 N., R. 92 W.,<br>Sec. 4: Lot 1<br>41.31 ac. | All alternatives |
| 121 | T. 35 N., R. 90 W.,<br>Sec. 10: SE¼SW¼<br>40 ac. | All alternatives |
| 122 | T. 34 N., R. 94 W.,<br>Sec. 31: NE¼NE¼<br>32: NW¼NW¼<br>80 ac. | All alternatives |
| 124 | T. 31 N., R. 92 W.,<br>Sec. 33: S½NW¼<br>80 ac. | All alternatives |
| 127 | T. 30 N., R. 93 W.,<br>Sec. 26: SW¼SW¼<br>34: NE¼NE¼<br>35: NW¼NW¼<br>120 ac. | Alternatives A and D |
| 133 | T. 29 N., R. 92 W.,<br>Sec. 23: NE¼SE¼ 24: NW¼SW¼<br>80 ac. | All alternatives |
| 137 | T. 30 N., R. 89 W.,<br>Sec. 15: S½NW¼, SW¼<br>240 ac. | All alternatives |
| 138 | T. 30 N., R. 89 W.,<br>Sec. 9: SE¼<br>10: NW¼SW¼<br>200 ac. | All alternatives |

| Parcel No. | Legal Description | Identified for Disposal in Alternatives: |
|---|---|---|
| 139 | T. 32 N., R. 88 W.,<br>Sec. 3: NW¼SW¼<br>40 ac. | All alternatives |
| 140 | T. 32 N., R. 88 W.,<br>Sec. 15: W½SE¼<br>22: NW¼NE¼<br>120 Ac. | All alternatives |
| 141 | T. 32 N., R. 87 W.,<br>Sec. 3: Lot 4<br>41.58 ac. | All alternatives |
| 143 | T. 32 N., R. 87 W.,<br>Sec. 15: NW¼NE¼<br>40 ac. | All alternatives |
| 144 | T. 32 N., R. 87 W.,<br>Sec. 31: NW¼SE¼<br>40 ac. | All alternatives |
| 145 | T. 31 N., R. 87 W.,<br>Sec. 5: SE¼NE¼, NE¼SE¼<br>80 ac. | All alternatives |
| 146 | T. 31 N., R. 87 W.,<br>Sec. 28: W½NE¼<br>80 ac. | Alternatives B and C and D with restrictions |
| 147 | T. 32 N., R. 85 W.,<br>Sec. 13: NE¼NE¼<br>40 ac. | All alternatives |
| 149 | T. 30 N., R. 85 W.,<br>Sec. 7: SE¼SW¼<br>18: E½NW¼<br>120 ac. | Alternative A |
| 150 | T. 30 N., R. 85 W.,<br>Sec. 29: NW¼NE¼, NE¼NW¼<br>80 ac. | Alternative A |

| Parcel No. | Legal Description | Identified for Disposal in Alternatives: |
|---|---|---|
| 151 | T. 30 N., R. 85 W.,<br><br>Sec. 28: SW¼SW¼<br><br>40 ac. | Alternatives A and D |
| 158 | T. 29 N., R. 88 W.,<br><br>Sec. 20: NE¼NW¼,<br><br>E2NW¼NW¼,<br><br>NW¼NW¼NW¼<br><br>19: N½NE¼NE¼,<br><br>SW¼SE¼NE¼<br><br>100 ac. | Alternatives A and D |
| 160 | T. 28 N., R. 89 W.,<br><br>Sec. 24: SW¼NW¼<br><br>40 ac. | All alternatives |
| 167 | T. 33 N., R. 93 W.,<br><br>Sec. 33: E½E½<br><br>34: W½NW¼<br><br>240 ac. | All alternatives |
| 168 | T. 29 N., R. 92 W.,<br><br>Sec. 1: NE ¼, NW ¼ NW ¼, SW ¼, NE ¼ SE ¼, S ½ SE ¼<br><br>2: NE ¼ SW ¼, S1/2 SW ¼, SE ¼<br><br>3: SE ¼ SE ¼<br><br>11: NE ¼, E ½ NW ¼, SW ¼, SE ¼<br><br>12: All<br><br>13: N ½<br><br>14: NE ¼, NE ¼ NW ¼<br><br>T. 29 N., R. 91 W.,<br><br>Sec, 6: NW ¼, SW ¼, NE ¼ SEC ¼, S ½ SE ¼<br><br>7: SW ¼, SW ¼ SE ¼<br><br>18: N ½ NW ¼<br><br>3,240 ac. | Alternative D |

| Parcel No. | Legal Description | Identified for Disposal in Alternatives: |
|---|---|---|
| 169 | T. 33 N., R. 90 W.,<br><br>Sec. 9: Lots 1 and 2, and NE¼SE¼;<br><br>10: Lots 1-3, inclusive, NW¼, W½SE¼, and the unpatented portion of Mineral Survey No. 644 lying within Sec. 10;<br><br>15: Lots 1-8, inclusive, S½NE¼, NW¼NE¼, N½SE¼, SE¼SE¼, and the unpatented portions of Mineral Survey Nos. 587 and 644 lying within Sec. 15;<br><br>21: E½NE¼, and NE¼SE¼;<br><br>22: Lots 1-4, inclusive, NE¼NE¼, and the unpatented portions of Mineral Survey Nos. 582, 584, and 587 lying within the N½, NW¼SW¼, and N½SE¼<br><br>1,091 ac. | Alternative D |
| 170 | T. 32 N., R. 85 W.,<br><br>Section 15: NW ¼ NW ¼ NW ¼ SE ¼<br><br>2.5 ac. | Alternative D |
| 171 | T. 32 N., R. 85 W.,<br><br>Sec. 15: W½NW¼NW¼NW¼SE ¼<br><br>1.25 ac. | Alternative D |

# Appendix T. Surface Disturbance and Reasonable Foreseeable Actions

This appendix includes information on surface disturbance and reasonable foreseeable actions within the planning area. Table T.1, "Summary of Projected Acres of Surface Disturbance by Resource" (p. 1642) provides projected acres of surface disturbance by resource. Table T.2, "Oil and Gas Reasonable Foreseeable Development Assumptions" (p. 1649) provides foreseeable development assumptions for oil and gas; the projected surface disturbances for oil and gas in Table T.1, "Summary of Projected Acres of Surface Disturbance by Resource" (p. 1642) are based on the project assumptions in Table T.2, "Oil and Gas Reasonable Foreseeable Development Assumptions" (p. 1649). Assumptions for all other resources are provided in each resource section in Table T.1, "Summary of Projected Acres of Surface Disturbance by Resource" (p. 1642).

## Table T.1. Summary of Projected Acres of Surface Disturbance by Resource

| Type of Disturbance | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| **Mineral Resources – Leasable Oil and Gas (includes CBNG)** | | | | |
| Acres Short-Term Disturbance from BLM Actions | 15,405 | 10,720 | 15,473 | 14,473 |
| Acres Reclaimed from BLM Actions | 7,410 | 5,242 | 7,441 | 6,978 |
| Acres Long-Term Disturbance from BLM Actions | 7,995 | 5,478 | 8,032 | 7,495 |
| Acres Short-Term Disturbance from Non-BLM Actions | 7,070 | 7,060 | 7,070 | 7,060 |
| Acres Reclaimed from Non-BLM Actions | 3,359 | 3,354 | 3,359 | 3,354 |
| Acres Long-Term Disturbance from Non-BLM Actions | 3,711 | 3,706 | 3,711 | 3,706 |
| **Mineral Resources - Locatable** | | | | |
| Acres Short-Term Disturbance from BLM Actions | 2,169.2 | 2,169.2 | 2,169.2 | 2,169.2 |
| Assumptions | Assumes that historical use will continue for the 20 years of the plan.<br><br>Notice level activities: assumes 13.46 acres of surface disturbance per year over the 20 years of the plan, based upon 282 acres total over the period 1989-2009.<br><br>Plan of Operations level activities: Assumes 95 acres of surface disturbance per year based on 1,995.3 total acres over the last 21 years. | | | |
| Acres Reclaimed from BLM Actions | 269.2 | 269.2 | 269.2 | 269.2 |
| Assumptions | Assumes that the 13.46 acres per year of short-term disturbance from actions under a Notice are reclaimed within two years. | | | |
| Acres Long-Term Disturbance from BLM Actions | 1,900 | 1,900 | 1,900 | 1,900 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Assumptions | BLM manages almost all locatable minerals (see Chapter 3) and it is speculative as to how much development will occur. | | | |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| **Mineral Resources – Mineral Material Disposals** | | | | |
| Acres Short-Term Disturbance from BLM Actions | 3,660 | 3,660 | 3,660 | 3,660 |
| Acres Reclaimed from BLM Actions | 3,660 | 3,660 | 3,660 | 3,660 |
| Assumptions | Assumes that historical averages of 183 acres per year will continue at past rate, which reflects the use of mineral materials for extensive AML reclamation. Assumes that area will be reclaimed upon completion of the removal of the material. | | | |
| Acres Long-Term Disturbance from BLM Actions | 0 | 0 | 0 | 0 |
| Assumptions | Assumes demand for mineral material is flat. Therefore, either there will be no mineral materials disposals on state and private land or if there are, the federal disturbance would be reduced by an equal amount. | | | |
| Acres Short-Term Disturbance from Non-BLM Actions | 0 | 0 | 0 | 0 |
| Acres Reclaimed from Non-BLM Actions | 0 | 0 | 0 | 0 |

| Type of Disturbance | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| Acres Long-Term Disturbance from Non-BLM Actions | 0 | 0 | 0 | 0 |
| **Fire and Fuels Management** [1] | | | | |
| *Prescribed Fire* | | | | |
| Acres Short-Term Disturbance from BLM Actions | 6,000 | 20,000 | 6,000 | 10,000 |
| Assumptions | Assumes 300 acres per year for 20 years. | Assumes 1,000 acres per year for 20 years. | Assumes 300 acres per year for 20 years. | Assumes 500 acres per year for 20 years. |
| Acres Reclaimed from BLM Actions | 6,000 | 20,000 | 6,000 | 10,000 |
| Acres Long-Term Disturbance from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Assumptions | BLM considers this too speculative to quantify. | | | |
| *Mechanical Fuels Treatment* | | | | |
| Acres Short-Term Disturbance from BLM Actions | 10,000 | 30,000 | 10,000 | 10,000 |
| Assumptions | Assumes 500 acres per year. | Assumes 1,500 acres per year. | Assumes 500 acres per year. | Assumes 500 acres per year. |
| Acres Reclaimed from BLM Actions | 10,000 | 30,000 | 10,000 | 10,000 |
| Acres Long-Term Disturbance from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Short-Term Disturbance from Non-BLM Actions[2] | 8,500 | 8,500 | 8,500 | 8,500 |
| Assumptions | Assumes 425 acres per year. | Assumes 425 acres per year. | Assumes 425 acres per year. | Assumes 425 acres per year. |
| Acres Reclaimed from Non-BLM Actions | 8,500 | 8,500 | 8,500 | 8,500 |
| Acres Long-Term Disturbance from Non-BLM Actions | 0 | 0 | 0 | 0 |
| Assumptions | The number of acres of treatment may be low as it includes estimates from USFS which may increase in the future as pine beetle damaged areas are treated. In addition, WGFD and private parties conduct treatments which have short-term disturbance but limited long-term disturbance. | | | |
| **Forest, Woodlands, and Forest Products** | | | | |
| Acres Short-Term Disturbance from BLM Actions | 375 | 550 | 550 | 600 |
| Assumptions | Assumes historic patterns will continue. | Assumes small increase because of beetle kill. | Assumes small increase because of beetle kill. | Assumes small increase because of beetle kill plus more cutting for safety. |
| Acres Reclaimed from BLM Actions | 375 | 550 | 550 | 600 |
| Assumptions | Assumes all acres will be reclaimed. | | | |
| Acres Long-Term Disturbance from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |

| Type of Disturbance | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| Assumptions | BLM considers this too speculative to quantify. Substantial potential exists for forest product removal from the Shoshone National Forest. In Fiscal Year 2010, the Shoshone National Forest had American Recovery and Reinvestment Act related stimulus funds and treated approximately 5,000 acres. Generally, this number is very low. | | | |
| **Invasive Species** | | | | |
| Acres Short-Term Disturbance from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Reclaimed from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Long-Term Disturbance from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Short-Term Disturbance from Non-BLM Actions | 10,000 | 10,000 | 10,000 | 10,000 |
| Assumptions | Assumes 500 acres per year. | Assumes 500 acres per year. | Assumes 500 acres per year. | Assumes 500 acres per year. |
| Acres Reclaimed from Non-BLM Actions | 10,000 | 10,000 | 10,000 | 10,000 |
| Acres Long-Term Disturbance from Non-BLM Actions | 0 | 0 | 0 | 0 |
| Assumptions | Assumes consistent treatment by WGFD on non-BLM surface, treatment by Firewise, and private services. Assumes brush-type treatments which are fully reclaimed. | | | |
| **Renewable Energy - Wind-Energy Development** | | | | |
| Acres Short-Term Disturbance from BLM Actions | 2,250 | 0 | 108,000 | 2,250 |
| Assumptions | 1 project with 50 turbines over 20 years | No projects | 2,400 turbines, averaged to 5,400 acres per year | 1 project with 50 turbines over 20 years |
| Acres Reclaimed from BLM Actions | 1,250 | 0 | 60,000 | 1,250 |
| Assumptions | Assumes that 25 acres/turbine will be reclaimed within 2 years and that 20 acres/turbine will be long-term surface disturbance. | | | |
| Acres Long-Term Disturbance from BLM Actions | 1,000 | 0 | 48,000 | 1,000 |
| **Rights-of-Way (ROW)** | | | | |
| *Telephone and Fiber Optics* | | | | |
| Acres Short-Term Disturbance from BLM Actions | 269 | 54 | 277 | 144 |
| Assumptions | 13.43 per year (historic trend) | 2.68 per year (historic trend reduced by percent based on areas excluded to ROW) | 13.83 per year (historic trend increased by percentage reduced areas excluded to ROW) | 7.22 per year (historic trend reduced by percentage areas excluded to ROW) |
| Acres Reclaimed from BLM Actions | 269 | 54 | 277 | 144 |
| Assumptions | Assumes that any disturbance is reclaimed within 2 years. | | | |
| Acres Long-Term Disturbance from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |

| Type of Disturbance | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| *Pipelines (oil and gas)* | | | | |
| Acres Short-Term Disturbance from BLM Actions | 8,950 | 7,017 | 9,208 | 8,555 |
| Assumptions | Assumes historic average will continue. | Assumes historic average reduced by percent fewer wells. | Assumes historic average increased by percent more wells. | Assumes historic average reduced by percent fewer wells. |
| Acres Reclaimed from BLM Actions | 8,950 | 7,017 | 9,208 | 8,555 |
| Assumptions | Assumes pipelines will be reclaimed within 2 years. | | | |
| Acres Long-Term Disturbance from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| *Roads[2]* | | | | |
| Acres Short-Term Disturbance from BLM Actions | 231.80 | 36.36 | 237.93 | 115.5 |
| Acres Reclaimed from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Long-Term Disturbance from BLM Actions | 231.80 | 36.36 | 237.93 | 115.5 |
| Assumptions | Assumes historic average will continue. | Assumes historic average reduced by percent excluded to ROW. | Assumes historic average increased by percent open to ROW. | Assumes historic average reduced by percent excluded to ROW. |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| *Powerlines (power and telephone)* | | | | |
| Acres Short-Term Disturbance from BLM Actions | 1,969.2 | 393.84 | 2,028 | 984.6 |
| Assumptions | Assumes historic average will continue. | Assumes historic average reduced by percent excluded to ROW. | Assumes historic average increased by percent open to ROW. | Assumes historic average reduced by percent excluded to ROW. |
| Acres Reclaimed from BLM Actions | 1,969.2 | 393.84 | 2,028 | 984.6 |
| Acres Long-Term Disturbance from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| *Communication Sites* | | | | |
| Acres Short-Term Disturbance from BLM Actions | 412.8 | 15 | 425.18 | 57.84 |

| Type of Disturbance | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| Assumptions | Assumes historic average of 20.64 acres per year will continue. | Assumes minor expansion of designated sites will be disturbed at a rate lower than historical average. | Assumes historic average increased by percent open to ROW. | Assumes minor expansion of designated sites will be disturbed at a rate lower than historical average. |
| Acres Reclaimed from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Long-Term Disturbance from BLM Actions | 412.8 | 57.84 | 425.18 | 57.84 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| *Other Facilities*[3] | | | | |
| Acres Short-Term Disturbance from BLM Actions | 39 | 30.6 | 40 | 37.32 |
| Assumptions | Assumes historic average of 1.95 acres per year will continue. | Assumes 1.53 acres (historic average reduced by percent fewer wells). | Assumes 2 acres per year acres (historic average increased by percent more wells). | Assumes 1.87 acres (historic average reduced by percent fewer wells). |
| Acres Reclaimed from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Long-Term Disturbance from BLM Actions | 39 | 30.6 | 40 | 37.32 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| **Livestock Grazing** | | | | |
| *Spring Development* | | | | |
| Acres Short-Term Disturbance from BLM Actions | 82.4 | 0 | 88.4 | 45.76 |
| Assumptions | Assumes 4.12 acres per year. | Assumes 0 acres per year. | Assumes 4.42 acres per year. | Assumes 2.29 acres per year. |
| Acres Reclaimed from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Long-Term Disturbance from BLM Actions | 82.4 | 0 | 88.4 | 45.76 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| *Reservoir/Pit Development* | | | | |
| Acres Short-Term Disturbance from BLM Actions | 220 | 0 | 240 | 121 |
| Assumptions | Assumes 11 acres per year. | Assumes 0 acres per year. | Assumes 12 acres per year. | Assumes 6 acres per year. |
| Acres Reclaimed from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Long-Term Disturbance from BLM Actions | 220 | 0 | 240 | 121 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |

| Type of Disturbance | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| *Fence Development* | | | | |
| Acres Short-Term Disturbance from BLM Actions | 443.8 | 0 | 1,432 | 620 |
| Assumptions | Assumes 22.19 acres per year. | Assumes no fences. | Assumes 71.6 acres per year. | Assumes 31 acres per year. |
| Acres Reclaimed from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Long-Term Disturbance from BLM Actions | 443.8 | 0 | 1,432 | 620 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| *Well Development* | | | | |
| Acres Short-Term Disturbance from BLM Actions | 113.8 | 0 | 236 | 60.4 |
| Assumptions | Assumes 5.69 acres per year. | Assumes no wells. | Assumes 11.80 per year. | Assumes 3.02 acres per year. |
| Acres Reclaimed from BLM Actions | 0 | 0 | 0 | 0 |
| Acres Long-Term Disturbance from BLM Actions | 113.8 | 0 | 236 | 60.4 |
| Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| **Cumulative Disturbance** | | | | |
| Total Acres Short-Term Disturbance from BLM Actions | 52,591 | 74,689 | 160,065 | 53,894 |
| Total Acres Reclaimed from BLM Actions | 40,152 | 67,186 | 99,433 | 42,441 |
| Total Acres Long-Term Disturbance from BLM Actions | 12,439 | 7,502 | 60,631 | 11,453 |
| Total Acres Short-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Total Acres Reclaimed from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |
| Total Acres Long-Term Disturbance from Non-BLM Actions | Unknown | Unknown | Unknown | Unknown |

| Type of Disturbance | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| Cumulative Long-Term Acres of Disturbance | Unknown | Unknown | Unknown | Unknown |

[1] Areas disturbed by mechanical fuels treatment will naturally be reclaimed within 3 to 5 years; areas disturbed by prescribed fire will naturally be reclaimed within 3 to 5 years.
[2] Approximately 50 percent of roads would be oil and gas related (based on the *Reasonable Foreseeable Development Scenario for Oil and Gas, Lander Field Office, Wyoming*).
[3] Historically, these facilities are oil and gas.

AML abandoned mine land
BLM Bureau of Land Management
CBNG coalbed natural gas
ROW right-of-way
USFS United States Forest Service
WGFD Wyoming Game and Fish Department

## Table T.2. Oil and Gas Reasonable Foreseeable Development Assumptions

| Well Projections | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| **Well Projections on BLM-Administered Land for Existing Active Wells and All New Wells (short-term)** | | | | |
| Existing Wells (total) | 887 | 887 | 887 | 887 |
| Non-coalbed Exploratory | 113 | 113 | 113 | 113 |
| Non-coalbed Development | 722 | 722 | 722 | 722 |
| CBNG | 5 | 5 | 5 | 5 |
| Deep | 47 | 47 | 47 | 47 |
| New Wells (total) | 2,274 | 1,528 | 2,284 | 2,125 |
| Non-coalbed Exploratory | 237 | 189 | 237 | 227 |
| Non-coalbed Development | 1,511 | 1,209 | 1,516 | 1,447 |
| CBNG | 480 | 93 | 484 | 406 |
| Deep | 46 | 37 | 47 | 45 |
| **Well Projections on BLM-Administered Land for All New Producing Wells and Existing Active Wells Less Abandonments (long-term)** | | | | |
| Existing Wells (total) | 675 | 675 | 675 | 675 |
| Non-coalbed Exploratory | 85 | 85 | 85 | 85 |
| Non-coalbed Development | 545 | 545 | 545 | 545 |
| CBNG | 5 | 5 | 5 | 5 |
| Deep | 40 | 40 | 40 | 40 |
| New Wells (total) | 1,820 | 1,194 | 1,828 | 1,695 |
| Non-coalbed Exploratory | 142 | 113 | 142 | 136 |
| Non-coalbed Development | 1,209 | 967 | 1,213 | 1,158 |
| CBNG | 432 | 84 | 436 | 365 |
| Deep | 37 | 30 | 38 | 36 |
| **Well Projections on Non-BLM-Administered Land for Existing Active Wells and All New Wells (short-term)** | | | | |
| Existing Wells | 1,377 | 1,377 | 1,377 | 1,377 |
| Non-coalbed Exploratory | 180 | 180 | 180 | 180 |
| Non-coalbed Development | 1,148 | 1,148 | 1,148 | 1,148 |
| CBNG | 23 | 23 | 23 | 23 |
| Deep | 26 | 26 | 26 | 26 |
| New Wells | 1,060 | 1,060 | 1,060 | 1,060 |
| Non-coalbed Exploratory | 94 | 94 | 94 | 94 |
| Non-coalbed Development | 596 | 597 | 596 | 597 |
| CBNG | 343 | 343 | 343 | 343 |
| Deep | 27 | 26 | 27 | 26 |
| **Well Projections on Non-BLM-Administered Land for All New Producing Wells and Existing Active Wells Less Abandonments (long-term)** | | | | |
| Existing Wells | 1,102 | 1,102 | 1,102 | 1,102 |
| Non-coalbed Exploratory | 145 | 145 | 145 | 145 |

| Well Projections | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| Non-coalbed Development | 926 | 926 | 926 | 926 |
| CBNG | 11 | 11 | 11 | 11 |
| Deep | 20 | 20 | 20 | 20 |
| New Wells | 864 | 864 | 864 | 864 |
| Non-coalbed Exploratory | 56 | 56 | 56 | 56 |
| Non-coalbed Development | 477 | 478 | 477 | 478 |
| CBNG | 309 | 309 | 309 | 309 |
| Deep | 22 | 21 | 22 | 21 |
| Assumptions | Surface disturbance resulting from the well projections above assume the following acres of surface disturbance for each type of well from well pads, access roads, and flow lines:<br>● Short-term well projections (new wells):<br>○ Non-coalbed exploratory (12.5 acres of surface disturbance per well)<br>○ Non-coalbed development (6 acres of surface disturbance per well)<br>○ CBNG (5.5 acres of surface disturbance per well)<br>○ Deep (16 acres of surface disturbance per well)<br>● Long-term well projections:<br>○ Non-coalbed exploratory (9 acres of surface disturbance per well)<br>○ Non-coalbed development (4 acres of surface disturbance per well)<br>○ CBNG (3.5 acres of surface disturbance per well)<br>○ Deep (10 acres of surface disturbance per well) | | | |

Source: Reasonable Foreseeable Development Scenario for Oil and Gas, Lander Field Office, Wyoming (BLM 2009c)

BLM Bureau of Land Management
CBNG coalbed natural gas

# Appendix U. Technical Support Document for Air Resources

## U.1. Introduction

This air resources technical support document describes the data and methodology used to conduct and serve as the basis for the air quality impact analysis included in Chapter 4 of the Lander Resource Management Plan (RMP) and Environmental Impact Statement (EIS).

### U.1.1. Study Area

The study area for this analysis is focused on the Lander Field Office planning area and includes cumulative emission sources and potential impacts to Class I areas within 100 kilometers of the planning area. Federal Prevention of Significant Deterioration (PSD) Class I areas are afforded special protection under the 1970 Clean Air Act (CAA). This study includes the following Class I areas, which were selected due to their close proximity to the Lander Field Office.

- Bridger Wilderness Area
- Fitzpatrick Wilderness Area
- Washakie Wilderness Area
- Yellowstone National Park
- Teton Wilderness Area
- Grand Teton National Park

### U.1.2. Pollutants Addressed in the Analysis

The basic framework for controlling air pollutants in the United States is mandated by the CAA and its amendments and the 1999 Regional Haze Regulations. The CAA addresses criteria air pollutants, National Ambient Air Quality Standards (NAAQS) for criteria air pollutants, the PSD program, and emission standards for hazardous air pollutants (HAPs). The Regional Haze Regulations address visibility impairment.

Criteria pollutants are those for which NAAQS have been established. Ambient air concentrations of these constituents greater than the national standards represent a risk to human health. Criteria pollutants include carbon monoxide (CO), nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), ozone ($O_3$), particulate matter ($PM_{10}$, $PM_{2.5}$), and lead. Volatile organic compounds (VOCs) are a group of pollutants for which there is no established ambient air quality standard but which are regulated under the CAA. VOCs are organic compounds that participate in photochemical reactions in the atmosphere and are critical to $O_3$ formation. HAPs are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological impacts. The United States Environmental Protection Agency (EPA) has issued reference concentrations for evaluating the inhalation risk for cancerous and noncancerous health impacts for chronic inhalation. Pollutants that are responsible for degradation of visibility and atmospheric deposition include sulfur and nitrogen compounds and fine particulate matter ($PM_{2.5}$). Nitric acid and nitrate are not emitted directly into the air, but form in the atmosphere from industrial and automotive emissions of nitrogen oxides ($NO_x$). Sulfate is formed in the atmosphere from industrial emissions of $SO_2$. Deposition

of these compounds can adversely impact terrestrial and aquatic vegetation, soil chemistry, and aquatic chemistry. Ambient concentrations of these pollutants can cause reduced visibility (haze). Greenhouse gases (GHGs) are those pollutants that are effective at trapping heat in the earth's atmosphere and have been attributed to climate change. These pollutants include carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$).

The air pollutants addressed in this analysis included criteria pollutants ($NO_x$, $PM_{10}$, $PM_{2.5}$, CO, $SO_2$, and $O_3$), VOCs, HAPs, and GHGs (specifically $CO_2$, $CH_4$, and $N_2O$). These pollutants were included in this analysis because: 1) they were identified as compounds that had potential to be emitted by management actions and activities within the planning area; 2) sufficient production and operational data was available to estimate emissions; and, 3) scientifically defensible or actual emission factors were available to quantify emissions. Lead, a criteria pollutant, was primarily a concern before the widespread use of unleaded gasoline and emissions from fuel combustion were a concern. Lead was not included in this analysis as emissions from projected activities would be negligible. Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride were not included in the analysis of GHGs because the proposed management activities and actions are not typically sources of these pollutants and emissions would be negligible or zero.

## U.1.3. Thresholds of Significance

### *Criteria Pollutants*

In order to protect and enhance the quality of the nation's air resources, EPA established NAAQS. Wyoming Department of Environmental Quality (DEQ) has established Wyoming Ambient Air Quality Standards (WAAQS). Primary standards are set at the level required to protect human health with an "adequate margin of safety" and must safeguard the public as a whole. Secondary standards are set at the level that protects public welfare, which is defined to include all forms of environmental damage, including but not limited to impacts on visibility, water, soil, and climate. Table U.1, "National and Wyoming Ambient Air Quality Standards" (p. 1652) shows the current NAAQS and WAAQS. The Bureau of Land Management (BLM) cannot authorize any activity that would not conform to all applicable local, state, tribal, and federal air quality laws, regulations, standards.

**Table U.1. National and Wyoming Ambient Air Quality Standards**

| Pollutant | Averaging Time | National Ambient Air Quality Standards | | | | | | Wyoming Ambient Air Quality Standards | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary | | | Secondary | | | Primary | | |
| | | (ppm) | (ppb) | (µg/m³) | (ppm) | (ppb) | (µg/m³) | (ppm) | (ppb) | (µg/m³) |
| Carbon Monoxide | 1 hour | **35** [(a)] | 35,000 | 40,000 | None | | | 35 | 35,000 | **40 (mg/m³)** |
| | 8 hour | **9** [(a)] | 9,000 | 10,000 | None | | | 9 | 9,000 | **10 (mg/m³)** |
| Lead | Rolling 3-month | --- | --- | **0.15** | Same as Primary | | | --- | --- | **0.15** |
| Nitrogen Dioxide | 1 hour | 0.1 | **100** [(b)] | 189 | None | | | --- | --- | --- |
| | Annual (Arithmetic Mean) | **0.053** | 53 | 100 | Same as Primary | | | 0.05 | 50 | **100** |

| Pollutant | Averaging Time | National Ambient Air Quality Standards | | | | | | Wyoming Ambient Air Quality Standards | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary | | | Secondary | | | Primary | | |
| | | (ppm) | (ppb) | (µg/m³) | (ppm) | (ppb) | (µg/m³) | (ppm) | (ppb) | (µg/m³) |
| $PM_{10}$ | 24 hour | --- | --- | **150** (c) | Same as Primary | | | --- | --- | **150** (c) |
| | Annual (Arithmetic Mean) | None | | | None | | | --- | --- | **50** |
| $PM_{2.5}$ | 24 hour | --- | --- | **35** (d) | Same as Primary | | | --- | --- | **35** (d) |
| | Annual (Arithmetic Mean) | --- | --- | **15.0** (e) | Same as Primary | | | --- | --- | **15.0** (e) |
| Ozone | 8 hour | **0.075** (f) | 75 | 147 | Same as Primary | | | **0.08** | 80 | 157 |
| Sulfur Dioxide | 1 hour | 0.075 | **75** (g) | 197 | None | | | --- | --- | --- |
| | 3 hour | None | | | **0.5** (a) | 500 | 1,300 | 0.50 | 500 | **1,300** |
| | 24 hour | None | | | None | | | 0.10 | 100 | **260** |
| | Annual (Arithmetic Mean) | None | | | None | | | 0.02 | 20 | **60** |
| Hydrogen Sulfide | 1/2 hour average | --- | --- | --- | --- | --- | --- | 0.05 | 50 | **70** (h) |
| | 1/2 hour average | --- | --- | --- | --- | --- | --- | 0.03 | 30 | **40** (i) |

Note: **Bold** indicates the standard as written in the corresponding regulation. Other values are conversions.

(a) Not to be exceeded more than once per year. (b) To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010). (c) Not to be exceeded more than once per year on average over 3 years. (d) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³ (effective December 17, 2006). (e) To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³. (f) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective March 27, 2008). (g) To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb (effective June 22, 2010). (h) Not to be exceeded more than two times per year. (i) Not to be exceeded more than two times in any five consecutive days.

$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ppb parts per billion
ppm parts per million
µg/m³ micrograms per cubic meter
mg/m³ milligrams per cubic meter

The CAA includes provisions for the PSD in designated areas. The goal of the PSD program is "to preserve, protect and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores and other areas of special national or regional natural, recreation, scenic or historic value." A classification system was established identifying allowable amounts of additional air quality degradation (increments) which would be allowed above legally established baseline levels (Table U.2, "Prevention of Significant Deterioration Increments" (p. 1654)). PSD Class I areas have the greatest limitations, with a very limited amount of additional degradation allowed, primarily national parks and wilderness areas. The remainder of the nation (outside non-attainment and maintenance areas) was designated as PSD Class II areas, where moderate deterioration and controlled growth is allowed. In its project specific EISs, BLM may compare cumulative concentrations of air pollutants to the PSD increments as an indication of a level of concern.

**Table U.2. Prevention of Significant Deterioration Increments**

| Pollutant | Averaging Period | PSD Increment – Class I (µg/m³) | PSD Increment – Class II (µg/m³) |
|---|---|---|---|
| Sulfur Dioxide ($SO_2$) | 3 hour | 25 | 512 |
| | 24 hour | 5 | 91 |
| | Annual | 21 | 20 |
| Particulate Matter ($PM_{10}$) | 24 hour | 8 | 30 |
| | Annual | 4 | 17 |
| Nitrogen Dioxide ($NO_2$) | Annual | 2.5 | 25 |
| Carbon Monoxide (CO) | 1 hour | None | None |
| | 8 hour | None | None |
| Lead 3 months | 3 months | None | None |

Source: 40 CFR 51.166(c)

PSD Prevention of Significant Deterioration
µg/m³ micrograms per cubic meter

### *Hazardous Air Pollutants*

Section 112 of the CAA lists more than 180 chemicals as HAPs. In addition, Sections 112(d) and 112(g) require regulatory agencies to establish Maximum Achievable Control Technology (MACT) Standards for sources that emit HAPs. Any source that emits or has the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs is considered a major source and will require a Title V, Part 70, operating permit review and permit. In addition to MACT standards, EPA has listed (on its Air Toxics Database) Reference Exposure Levels (RELs) for many of the HAPs. RELs are defined as concentrations at or below which no adverse health effects are expected.

### *Visibility*

Changes in visibility or regional haze are caused by fine particles and gases scattering and absorbing light. A 1.0 deciview (dv) change in light extinction is considered potentially significant in mandatory Federal PSD Class I areas as described in the EPA Regional Haze Regulations (40 Code of Federal Regulations [CFR] §51.300 et seq.). A 1.0-dv change is defined as approximately a 10 percent change in the extinction coefficient (corresponding to a 2 to 5 percent change in contrast, for a black target against a clear sky, at the most optically sensitive distance from an observer), which is a small but noticeable change in haziness under most circumstances when viewing scenes in mandatory Federal Class I areas. For multi-source projects located within range of a Class I area, changes in extinction of less than 5 percent (0.5 dv) are generally considered unlikely to result in adverse impacts to visibility. Changes in extinction greater than 10 percent (1.0 dv) are generally considered unacceptable and will likely require additional more refined impact analysis typically including an evaluation of mitigation measures.

### *Atmospheric Deposition*

The National Park Service (NPS) and United States Fish and Wildlife Service (USFWS) have established thresholds to evaluate nitrogen and sulfur deposition within Class I areas. These deposition analysis thresholds are defined as 0.005 kilogram per hectare per year (kg/ha/yr) in the western United States for both nitrogen and sulfur. These thresholds are typically used to analyze project alone impacts. Cumulative impacts are typically compared to the level of concern, which is defined by the NPS and USFWS as 3 kg/ha/yr for N and 5 kg/ha/yr for sulfur (Fox et al.1989)

in Rocky Mountain regions. Deposition rates that are below the level of concern are believed to cause no adverse impacts.

***Lake Chemistry***

The USFWS considers lake chemistry changes to be potentially significant if the screening methodology predicts decreases in acid neutralizing capacity (ANC) of more than defined limits of acceptable change (LAC). A lake's LAC depends on its background ANC value. The LAC is defined as a 10 percent change for lakes with ANC background values greater than 25 microequivalents per liter (meq/l) and is defined as a change of 1 meq/l for lakes with ANC background values less than 25 meq/l. If a lake's ANC is predicted to decrease by more than the applicable LAC then potential changes to lake chemistry may cause adverse effects and a more detailed analysis of lake chemistry impacts would be required.

## U.1.4. Emissions Generating Activities Included in Analysis

Air pollutant emissions were estimated for 11 different types of management actions or activities that were identified as having the potential to generate emissions of the specified pollutants. The following is a list summarizing the 11 sectors and the specific activities under each sector for which potential emissions were quantified.

***Leasable Minerals – Conventional Oil and Gas Development***

- Well pad and compressor station pad construction
- Road construction and maintenance
- Well drilling, completion, and testing
- Well completion flares
- Well workovers
- Construction vehicle exhaust and fugitive dust
- Maintenance vehicle exhaust and fugitive dust
- Commuting vehicle exhaust and fugitive dust
- Natural gas fired compressors
- Dehydrator, separator, and water tank heaters
- Dehydrator vents
- Tank venting, flashing, and loadout
- Wellhead equipment leaks
- Pneumatic pumps and devices
- Well pad and road reclamation
- Wind erosion

***Leasable Minerals – Coalbed Natural Gas Development***

- Well pad, compressor station pad, and water disposal well pad construction
- Road construction and maintenance
- Well drilling, completion, and testing
- Well workovers
- Construction vehicle exhaust and fugitive dust
- Maintenance vehicle exhaust and fugitive dust
- Commuting vehicle exhaust and fugitive dust
- Natural gas fired compressors

- Dehydrator and tank heaters
- Dehydrator vents
- Wellhead equipment leaks
- Pneumatic pumps and devices
- Well pad and road reclamation
- Wind erosion

***Locatable Minerals – Bentonite Mining***

- Construction vehicle exhaust and fugitive dust
- Maintenance vehicle exhaust and fugitive dust
- Commuting vehicle exhaust and fugitive dust
- Exploratory drilling
- Exploratory excavation and reclamation
- Mine development excavation and reclamation
- Product handling, transfer, and storage

***Locatable Minerals – Gold Mining***

- Construction vehicle exhaust and fugitive dust
- Maintenance vehicle exhaust and fugitive dust
- Commuting vehicle exhaust and fugitive dust
- Exploratory drilling
- Exploratory excavation and reclamation
- Mine development excavation and reclamation
- Product handling, transfer, and storage

***Locatable Minerals – Uranium Mining***

- Construction vehicle exhaust and fugitive dust
- Maintenance vehicle exhaust and fugitive dust
- Commuting vehicle exhaust and fugitive dust
- Injection well, production well, and monitoring well construction
- Well drilling and workovers
- Road and pipeline construction
- Road and well pad maintenance and reclamation
- Transport of resin

***Salable Minerals – Sand, Gravel, and other Mineral Development***

- Construction vehicle exhaust and fugitive dust
- Maintenance vehicle exhaust and fugitive dust
- Commuting vehicle exhaust and fugitive dust
- Product handling, transfer, and storage
- Wind erosion

***Fire Management and Ecology – Planned and Prescribed Fire***

- Heavy equipment exhaust and fugitive dust
- Commuting vehicle exhaust and fugitive dust
- Mechanical equipment (chainsaws, etc.) exhaust
- Smoke from prescribed fire

***Vegetation – Forests, Woodlands, and Aspen Communities Management***

- Heavy equipment and mechanical equipment exhaust and fugitive dust associated with tree harvesting, pole and post harvesting, firewood collection, tree salvaging, and weed control
- Commuting vehicle exhaust and fugitive dust

***Land Resources – Renewable Energy, Rights-of-Way, and Corridor Projects***

- Heavy equipment and mechanical equipment exhaust and fugitive dust associated with the construction of wind energy projects, telephone and fiber optics sites, pipelines, roads, powerlines, and communication sites.
- Commuting vehicle exhaust and fugitive dust

***Land Resources – Comprehensive Trails and Travel Management***

- Recreation trail and road maintenance
- Off-highway vehicles (OHVs)

***Land Resources – Livestock Grazing***

- Heavy equipment exhaust and fugitive dust associated with construction of springs, reservoirs, wells, pipelines, fences, and reservoir maintenance
- Commuting vehicle exhaust and fugitive dust
- Enteric fermentation and manure

There were some management activities that emissions were not estimated for because development potential was low, emissions were considered to be minor, or insufficient data was available to calculate emissions. Emissions from the following management actions were not estimated because the potential for development was considered low: coal mining, phosphate mining, oil shale development, geothermal development, gemstones and lapidary materials development. Emissions from the following management actions were not estimated because: (1) the level of activity is not expected to change between alternatives, (2) the magnitude of emissions from the activity is considered to be very small in comparison to other management activities, or (3) sufficient operational or production data was not available to quantify emissions: wildfires, invasive species and pest management, grassland and shrub land management, wild horse management and activities related to heritage and visual resources, socioeconomic resources, and fish and wildlife resources.

# U.2. Methodology

The air quality impact analysis included compiling an emissions inventory for existing conditions within the planning area as well as for projected future development. Emissions were estimated for each alternative and a comparative analysis was conducted. Emissions were based on reasonable future actions that were identified as having the potential to result in increased emissions of air pollutants. Emission estimates calculated for this analysis should not be assumed to be a definitive representation of future emissions. Depending on future economic conditions, mining and drilling methods, air pollution control technologies, and other factors that influence the pace of development, actual future emissions could be considerably different than presented. In addition, the size, location, and pace of development for future projects are not well known at this planning stage. For these reasons, it was determined that air quality modeling would not be included in this analysis. The input data required to conduct a modeling analysis was not available

and although "surrogate" input data could be used to force model results, those results would not be valuable to the decision maker or the public. As part of the National Environmental Policy Act (NEPA) analysis for actual development projects, the BLM will conduct an air quality analysis that will include air dispersion modeling of both project and cumulative impacts for those projects that may have a significant impact on air quality within the planning area.

For this analysis, air pollutant emissions were estimated over the 20 year life of project (LOP) for three specific years. The base year selected was 2008 because actual production, operational, and development data was most recently available for this year. The year 2018 was selected for the short-term year as development and construction projections for this year were the greatest across all resources. The year 2027 was selected as being representative of operational emissions over the long term. This section gives specific details on how emissions were estimated for the air resources analysis. The tables located in Section U.4, "Summary of Emissions" (p. 1665), at the end of this appendix summarize the projected total annual emissions by resource for 2008, 2018, and 2027.

# U.2.1. Emission Calculations by Category

***Leasable Minerals – Conventional Oil and Gas Development and Coalbed Natural Gas Development***

The basis for emission calculations for conventional oil and gas development was the Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas, Lander Field Office (BLM 2009c). According to the RFD up to 2,517 new conventional oil and natural gas wells and 827 coalbed natural gas (CBNG) wells may be drilled within the Lander Field Office planning area during the next 20 years. These numbers reflect the maximum level of development that can be expected during this time period. Table U.3, "Number of Existing and Proposed Wells by Alternative" (p. 1658) shows the number and types of wells for each alternative for both BLM wells and for non-BLM (private, state, or other federal) wells.

**Table U.3. Number of Existing and Proposed Wells by Alternative**

| | Conventional Wells (Non-BLM) | Conventional Wells (BLM) | CBNG Wells (Non-BLM) | CBNG Wells (BLM) |
|---|---|---|---|---|
| **Existing** | 2,236 | 882 | 28 | 5 |
| **Year – 2018** | | | | |
| Alternative A | 2,511 | 1,794 | 823 | 480 |
| Alternative B | 2,152 | 1,435 | 436 | 93 |
| Alternative C | 2,517 | 1,800 | 827 | 484 |
| Alternative D | 2,436 | 1,719 | 749 | 406 |
| **Year – 2027** | | | | |
| Alternative A | 1,942 | 1,388 | 741 | 432 |
| Alternative B | 1,665 | 1,110 | 392 | 84 |
| Alternative C | 1,948 | 1,392 | 744 | 436 |
| Alternative D | 1,885 | 1,330 | 674 | 365 |

Source: BLM 2009c

BLM Bureau of Land Management
CBNG coalbed natural gas

The following list identifies the assumptions and sources of information used in the calculations of emissions for this category:

- Emission factors for drill rig engines, diesel powered heavy (construction) equipment, generator engines, and other oil field equipment were obtained from EPA NONROADS 2008a Emissions Model (EPA 2009c).
- Emission factors for natural gas fired compressor engines were based on NSPS Emission Standards for Spark Ignition Engines 40 CFR Part 60 JJJJ, recent Best Available Control Technology (BACT) determinations by Wyoming DEQ, EPA's AP-42 Compilation of Air Pollutant Emission Factors (EPA 1995a), and American Petroleum Institute's (API) Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry (American Petroleum Institute 2009).
- Emission factors for on-road vehicles were obtained from EPA's MOBILE6.2 Motor Vehicle Emission Factor Model (EPA 2006).
- Emission factors for VOC and HAPs emissions oil and gas sources were based on EPA's AP-42, EPA's Protocol for Equipment Leak Emissions Estimates (EPA 1995b), Gas Technology Institute GRI-GLYCalc 4.0 emissions estimating software (GTI 2000), EPA's Natural Gas STAR Program (EPA No Date), Wyoming DEQ's Oil and Gas Production Facilities Permitting Guidance, Chapter 6, Section 2 revised March 2010 (Wyoming DEQ 2010b), and field gas analyses from the planning area.
- Activity and equipment data were obtained from resource specialists in the Lander Field Office, existing operator experience from producing fields in the planning area, and professional judgment.
- It was assumed that (1) natural gas fired engines would be equipped with non-selective catalytic reduction technology, (2) VOC and HAP emissions from dehydrators, tank flashing, pneumatic pumps, and produced water tanks would be controlled to 98 percent efficiency per Wyoming DEQ BACT, (3) and drill rig engines would comply with Tier II or better emission standards.
- It was assumed that water application as a best management practice (BMP) would reduce fugitive dust emissions from ground-disturbing activities during construction and reclamation activities and maintenance of roads by 50 percent from uncontrolled levels.

***Locatable Minerals – Bentonite Mining***

Emissions estimates for future bentonite mining were based on operating data from the one existing bentonite mine in the planning area and development potential estimated in the Final Mineral Occurrence and Development Potential Report (BLM 2009b). Because alternatives A and C would include the fewest restrictions on potential bentonite mining, it was assumed that in addition to the existing mine, two additional mines with similar operational characteristics would be operational in 2018 and 2027. Because of the additional restrictions on mineral development and the location of designated Areas of Critical Environmental Concern under Alternative B, it was assumed that only the existing mine would operate in the future. For Alternative D it was assumed that the existing mine and one additional mine would be operational in 2018 and 2027. Emission factors for this category were obtained from EPA's AP-42 (EPA 1995a), EPA's NONROADS 2008a Emissions model (EPA 2009c), EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2006), and API's Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry (American Petroleum Institute 2009).

***Locatable Minerals – Gold Mining***

Emissions estimates for future gold mining were based on the Decision Record and Environmental Assessment for the Rattlesnake Hills Gold Exploration Drilling Project, (BLM 2010l) located in the planning area, development potential estimated in the Final Mineral Occurrence and

Development Potential Report (BLM 2009b), and existing exploratory operations. It was assumed that the gold mining operations in the planning area consist of typical surface mining techniques and all processing is done offsite outside of the planning area. It was assumed that gold mining operations would be similar for all alternatives. Future emissions were based on the assumption that exploratory operations would continue and one mine similar to the proposed Rattlesnake Hills Project would be operational in 2018 and 2027. Emission factors for this category were obtained from EPA's AP-42, EPA's NONROADS 2008a Emissions model, and EPA's MOBILE6.2 motor vehicle emission factor model.

***Locatable Minerals – Uranium Mining***

Emission estimates for future uranium mining were based on the Plan of Operations for the proposed Gas Hills project, development potential estimated in the Final Mineral Occurrence and Development Potential Report (BLM 2009b), and existing exploratory operations. The assumptions for uranium mining were predicated on in-situ recovery mining. It is likely that open pit and underground conventional mines will be proposed and approved. However, the air emissions associated with those future projects will be analyzed on a site-specific basis. As of 2011, the BLM had begun preparing an EIS for a Plan of Operations for a conventional mine. Air emissions, including those associated with the Heap Leach Mill operation, are being analyzed. Those data are not yet available for inclusion in this document. Future emissions were based on the assumption that exploratory operations would continue and two mines similar to the proposed Gas Hills Project would be operational in 2018 and 2027 for alternatives. Emission factors for this category were obtained from EPA's AP-42, EPA's NONROADS 2008a Emissions model, EPA's MOBILE6.2 motor vehicle emission factor model, and API Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry.

***Salable Minerals – Sand, Gravel, and other Mineral Development***

Emissions were estimated for this category primarily for sand and gravel sales and free use permits but also included moss rock, limestone, and soil and fill permits and sales. Existing emission calculations were based on the average of permit and sales records from 1989 – 2009. Future emission calculations were based on the permit and sales records and the Final Mineral Occurrence and Development Potential Report (BLM 2009b). Future emissions were calculated using estimated tons of material to be processed for each alternative. Emission factors for this category were obtained from EPA's AP-42, EPA's NONROADS 2008a Emissions model, and EPA's MOBILE6.2 motor vehicle emission factor model.

***Fire Management and Ecology – Planned and Prescribed Fire***

Emission estimates for fire management were based on the number of acres of disturbance projected for each alternative for mechanical treatments and for prescribed burning. Emissions factors for mechanical treatments (heavy equipment, all terrain vehicles, and chain saws) were obtained from EPA's NONROADS 2008a Emissions model and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor model. Emission factors for $PM_{10}$, $PM_{2.5}$, $NO_x$, $SO_2$, CO, VOCs, $CH_4$, and $N_2O$ from smoke were obtained from Western Governors Association/Western Regional Air Partnership (WRAP) 2002 Fire Emission Inventory for the WRAP Region-Phase II (WRAP 2005).

***Vegetation – Forests, Woodlands, and Aspen Communities Management***

Emissions were estimated for this category for activities related to forest management (silviculture, insect control, and forest products harvesting) and were based on the numbers of acres of surface disturbance projected for each alternative. Emission factors for heavy equipment and logging equipment used in these activities were obtained from EPA's NONROADS 2008a Emissions model and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor model.

***Land Resources – Renewable Energy, Rights-of-Way, and Corridor Projects***

Emissions were estimated for this category for several surface-disturbing projects under Land Resources. Table U.4, "Basis for Emissions Calculations for Land Resources Projects" (p. 1661) shows the key criteria projected under each alternative that were used to as the basis for emissions calculations. Emission factors for surface-disturbing activities were obtained from EPA's AP-42. Emission factors for heavy equipment used in these activities were obtained from EPA's NONROADS 2008a Emissions model and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor model.

**Table U.4. Basis for Emissions Calculations for Land Resources Projects**

| Type of Project | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| Wind energy projects - acres of disturbance for life of project (20 years) | 2,250 | 0 | 108,000 | 2,250 |
| Wind energy projects - number of turbines | 50 | 0 | 2,400 | 50 |
| Telephone and fiber optics projects - acres of disturbance per year | 13.43 | 2.68 | 13.83 | 7.22 |
| Pipelines projects - acres of disturbance per year | 447 | 351 | 460 | 427 |
| Roads (non-mineral) projects - acres of disturbance per year | 231.8 | 46.36 | 237.93 | 115.5 |
| Powerline projects - acres of disturbance per year | 98.46 | 19.69 | 101.41 | 49.23 |
| Communication sites - acres of disturbance per year | 20.64 | 9.64 | 21.46 | 9.64 |
| Other - acres of disturbance per year | 39 | 30.61 | 40 | 37.32 |

***Land Resources – Comprehensive Trails and Travel Management***

Emission sources under this category included road maintenance within the planning area (recreational roads only, mineral development roads were included in those categories), trail maintenance (including cross-country ski trail grooming), and OHV use within the planning area. Road and trail maintenance emissions were estimated using historical data on miles maintained per year and equipment use. Future emissions were based on the number of miles to be maintained for each alternative. Emission factors for heavy equipment used in these activities were obtained from EPA's NONROADS 2008a Emissions model and emission factors for commuting vehicles were

obtained from EPA's MOBILE6.2 motor vehicle emission factor model. OHV emissions were estimated using EPA's NONROADS 2008a Emissions model which calculated annual emissions based on EPA's National Emissions Inventory and county population for 2005. Emissions were then projected for 2008, 2018, and 2027. It was assumed that OHV use would not change by alternative. Emission factors for surface-disturbing activities were obtained from EPA's AP-42.

***Land Resources – Livestock Grazing***

Emissions were estimated for six construction activities related to livestock grazing: springs, wells, fence, reservoir, and pipeline construction and reservoir maintenance. Emission estimates for these activities were based on the number of acres of disturbance projected for each activity under each alternative. In addition, $CH_4$ emissions related to animal enteric fermentation and manure deposits were calculated for estimated head of cattle, sheep, and horses projected for each alternative based on current livestock grazing permits. Emission factors for heavy equipment used in these activities were obtained from EPA's NONROADS 2008a Emissions model and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor model. Emission factors for enteric fermentation and manure management were obtained from the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (IPCC 2006).

# U.3. Mitigation and BMPs

The following table (Table U.5, "Emission Reduction Strategies for Oil and Gas Development" (p. 1662)) outlines emission reduction strategies for oil and gas development in the planning area.

**Table U.5. Emission Reduction Strategies for Oil and Gas Development**

| Mitigation Measure | Environmental Benefits | Environmental Liabilities | Feasibility |
|---|---|---|---|
| **Control Strategies for Drilling and Compression** | | | |
| Directional Drilling | Reduces construction related emissions (dust and vehicle and construction equipment emissions). Decreases surface disturbance and vegetation impacts (dust and $CO_2$ and nitrogen flux). Reduces habitat fragmentation | Could result in higher air impacts in one area with longer sustained drilling times. | Depends on geological strata |
| Improved engine technology (Tier 2 or better) for diesel drill rig engines | Reduced $NO_x$, PM, CO, and VOC emissions | | Dependent on availability of technology from engine manufacturers |
| SCR for drill rig engines and/or compressors | $NO_x$ emissions reduction and decreased formation of visibility impairing compounds. $NO_x$ control efficiency of 95% achieved on drill rig engines. $NO_x$ emission rate of 0.1 g/hp-hr achieved for compressors | Potential $NH_3$ emissions and formation of visibility impairing ammonium sulfate. Regeneration/disposal of catalyst can produce hazardous waste | Not applicable to 2-stroke engines |

| Mitigation Measure | Environmental Benefits | Environmental Liabilities | Feasibility |
|---|---|---|---|
| NSCR for drill rig engines and/or compressors | $NO_x$ emissions reduction and decreased formation of visibility impairing compounds. $NO_x$ control efficiency of 80-90% achieved for drill rig engines. $NO_x$ emission rate of 0.7 g/hp-hr achieved for compressor engines greater than 100 hp. | Regeneration/disposal of catalysts can produce hazardous waste | Not applicable to lean burn or 2-stroke engines |
| Natural gas fired drill rig engines | $NO_x$ emissions reduction and decreased formation of visibility impairing compounds | | Requires onsite processing of field gas. |
| Electrification of drill rig engines and/or compressors | Decreased emissions at the source. Transfers emissions to more efficiently controlled source | Displaces emissions to EGU | Depends on availability of power and transmission lines |
| Improved engine technology (Tier 2 or better) for all mobile and non-road diesel engines | Reduced $NO_x$, PM, CO, and VOC emissions | | Dependent on availability of technology from engine manufacturers |
| Green (a.k.a. closed loop or flareless) completions | Reduction in VOC and $CH_4$ emissions. Reduces or eliminate flaring and venting and associated emissions. Reduces or eliminates open pits and associated evaporative emissions. Increased recovery of gas to pipeline rather than atmosphere. | Temporary increase in truck traffic and associated emissions | Need adequate pressure and flow. Need onsite infrastructure (tanks/dehydrator). Availability of sales line. Green completion permits required by Wyoming BACT in some areas |
| Green workovers | Same as above | Same as above | Same as above |
| Minimize or eliminate venting and/or use closed loop process where possible during "blow downs" | Same as above | | Best Management Practices required by Wyoming BACT |
| Eliminate open pits | Reduces VOC and GHG emissions. Reduces potential for soil and water contamination. Reduces odors. | May increase truck traffic and associated emissions. | Requires tank and/or pipeline infrastructure. |
| Electrification of wellhead compression/pumping | Reduces local emissions of fossil fuel combustion and transfers to more easily controlled source. | Displaces emissions to EGU | Depends on availability of power and transmission lines |
| Wind (or other renewable) generated power for compressors | Low or no emissions. | May require construction of infrastructure. Visual impacts. Potential wildlife impacts. | Depends on availability of power and transmission lines |
| **Control Strategies Utilizing Centralized Systems** | | | |
| Centralization (or consolidation) of gas processing facilities (separation, dehydration, sweetening, etc.) | Reduced long-term truck traffic and associated emissions. Reduced VOC and GHG emissions from individual dehydrator/separator units. | Temporary increase in construction associated emissions. | Requires pipeline infrastructure. |

| Mitigation Measure | Environmental Benefits | Environmental Liabilities | Feasibility |
|---|---|---|---|
| Liquids Gathering systems (for condensate and produced water) | Reduced long-term truck traffic and associated emissions. Reduced VOC and GHG emissions from tanks. | Temporary increase in construction associated emissions. | Requires pipeline infrastructure. |
| Water and/or fracturing liquids delivery system | Reduced long-term truck traffic and associated emissions. | Temporary increase in construction associated emissions unless place above ground. | Requires pipeline infrastructure. Not feasible for some terrain. |
| **Control Strategies for Tanks, Separators, and Dehydrators** | | | |
| Eliminate use of open top tanks | Reduced VOC and GHG emissions | | Required by Wyoming BACT for produced water tanks in some areas. |
| Capture and control of flashing emissions from all storage tanks and separation vessels with vapor recovery and/or thermal combustion units. | Reduces VOC and GHG emissions. | | 98% VOC control if ≥ 10 TPY required statewide by Wyoming BACT |
| Capture and control of produced water tank emissions. | Reduces VOC and GHG emissions. | | 98% VOC control and no open top tanks required by Wyoming DEQ in some areas |
| Capture and control of dehydration equipment emissions with condensers, vapor recovery, and/or thermal combustion | Reduces VOC, HAP, and GHG emissions | | Still vent condensers required and 98% VOC control if ≥ 8 TPY required statewide and in CDA by Wyoming BACT. All dehydration emissions controlled at 98% in JPAD (no 8 TPY threshold) |
| **Control Strategies for Misc. Fugitive VOC Emissions** | | | |
| Install and maintain low VOC emitting seals, valves, hatches on production equipment | Reduces VOC and GHG emissions. | | |
| Initiate an equipment leak detection and repair program (including use of FLIR cameras, grab samples, organic vapor detection devices, visual inspection, etc.) | Reduction in VOC and GHG emissions | | |
| Install or convert gas operated pneumatic devices to electric, solar, or instrument (or compressed) air driven devices/controllers | Reduces VOC and GHG emissions. | Electric or compressed air driven operations can displace or increase combustion emissions. | |
| Use "low" or "no bleed" gas operated pneumatic devices/controllers | Reduces VOC and GHG emissions. | | Or closed loop required statewide by Wyoming BACT |
| Use closed loop system or thermal combustion for gas operated pneumatic pumps. | Reduces VOC and GHG emissions. | | Required statewide by Wyoming BACT (98% VOC control or closed loop) |

| Mitigation Measure | Environmental Benefits | Environmental Liabilities | Feasibility |
|---|---|---|---|
| Install or convert gas operated pneumatic pumps to electric, solar, or instrument (or compressed) air driven pumps | Reduces VOC and GHG emissions. | Electric or compressed air driven operations can displace or increase combustion emissions. | Required statewide by Wyoming BACT if no thermal combustion used. |
| Install vapor recovery on truck loading/unloading operations at tanks | Reduces emissions of VOC and GHG emissions. | | Wyoming BACT analysis required if VOC ≥ 8 TPY or HAP ≥ 5 TPY. |
| **Control Strategies for Fugitive Dust and Vehicle Emissions** | | | |
| Unpaved surface treatments including watering, chemical suppressants, and gravel. | 20% - 80% control of fugitive dust (particulates) from vehicle traffic. | Potential impacts to water and vegetation from runoff of suppressants. | |
| Use remote telemetry and automation of wellhead equipment | Reduces vehicle traffic and associated emissions. | | |
| Speed limit control and enforcement on unpaved roads | Reduction of fugitive dust emissions | | |
| Reduce commuter vehicle trips through car pools, commuter vans or buses, innovative work schedules, or work camps | Reduced combustion emissions, reduced fugitive dust emissions, reduced ozone formation, reduced impacts to visibility | | |
| **Miscellaneous Control Strategies** | | | |
| Use of ultra-low sulfur diesel in engines, compressors, construction equipment, etc. | Reduces emissions of particulates and sulfates | | Fuel not readily available in some areas. |
| Reduce unnecessary vehicle idling | Reduced combustion emissions, reduced ozone formation, reduced impacts to visibility, reduced fuel consumption | | |
| Reduced pace of (phased) development | Peak emissions of all pollutants reduced | Emissions generated at a lower rate but for a longer period | May not be economically viable. |

BACT Best Available Control Technology
$CH_4$ methane
CO Carbon Monoxide
$CO_2$ Carbon Dioxide
DEQ Department of Environmental Quality
EGU electric generating unit
FLIR Forward Looking Infrared Radiometer
g/hp-hr gallons per horsepower hour
GHG greenhouse gas
HAP Hazardous Air Pollutant
JPAD Joint Precision Airdrop System
Misc. Miscellaneous
$NH_3$ Ammonia
$NO_x$ Nitrogen Oxides
PM particulate matter
SCR Selective Catalytic Reduction
TPY tons per year
VOC Volatile Organic Compound

# U.4. Summary of Emissions

The following tables summarize the projected total annual emissions for each alternative by resource for years 2008, 2018, and 2027.

## Table U.6. Leasable Minerals – Conventional Oil and Gas Development – Federal Wells (Base Year – 2008)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 17 | 2 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment Combustive Emissions a | 7 | 7 | 134 | 3 | 36 | 10 | 1 | 15,524 | 0 | 0 | 15,576 | 14,090 |
| Well Completion Flaring | 0 | 0 | 2 | 0 | 11 | 63 | 6 | 2 | 0 | 0 | 2 | 2 |
| Commuting Vehicles - Construction | 28 | 3 | 1 | 0 | 1 | 0 | 0 | 280 | 0 | | 281 | 255 |
| Wind Erosion | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 59 | 13 | 137 | 3 | 49 | 73 | 7 | 15,806 | 0 | 0 | 15,859 | 14,347 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 11 | 11 | 308 | 1 | 154 | 154 | 46 | 123,032 | 257 | 1 | 128,778 | 117,047 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 172 | 0 | 0 | 172 | 156 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 241 | 91 | 2,623 | 160 | | 5,981 | 5,738 |
| Station Visits - Operations | 23 | 2 | 0 | 0 | 1 | 1 | 0 | 81 | 0 | | 81 | 73 |
| Well Workover - Operations | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 317 | 0 | 0 | 318 | 287 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 29 | 3 | 0 | 0 | 1 | 0 | 0 | 49 | 0 | | 49 | 45 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 282 | 28 | 20 | 47 | | 1,005 | 1,003 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 430 | 43 | 254 | 3,947 | | 83,149 | 83,125 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 316 | 32 | 186 | 2,899 | | 61,066 | 61,049 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 63 | 16 | 311 | 1 | 157 | 1,425 | 240 | 126,733 | 7,311 | 1 | 280,599 | 268,524 |
| | | | | | | | | | | | | |
| Road Maintenance | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 0 | | 60 | 54 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 0 | 0 | 60 | 54 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 0 | | 38 | 34 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | 39 | 35 |
| | | | | | | | | | | | | |
| Total Emissions | 125 | 29 | 449 | 4 | 206 | 1,498 | 247 | 142,638 | 7,311 | 1 | 296,557 | 282,961 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately | | | | | | | | | | | | |

## Table U.7. Leasable Minerals – Conventional Oil and Gas Development – Federal Wells (Alternative A – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 50 | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 22 | 22 | 402 | 9 | 109 | 30 | 3 | 46,562 | 0 | 0 | 46,718 | 42,261 |
| Well Completion Flaring | 1 | 1 | 6 | 0 | 34 | 189 | 19 | 7 | 0 | 0 | 7 | 6 |
| Commuting Vehicles - Construction | 84 | 9 | 3 | 0 | 3 | 1 | 0 | 839 | 0 | | 840 | 762 |
| Wind Erosion | 19 | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 176 | 39 | 411 | 9 | 146 | 220 | 22 | 47,407 | 0 | 0 | 47,564 | 43,030 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 31 | 31 | 904 | 2 | 452 | 452 | 136 | 361,003 | 755 | 3 | 377,862 | 343,440 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 505 | 0 | 0 | 506 | 458 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 709 | 266 | 7,696 | 469 | | 17,549 | 16,836 |
| Station Visits - Operations | 69 | 7 | 1 | 0 | 4 | 2 | 0 | 237 | 0 | | 237 | 215 |
| Well Workover - Operations | 1 | 0 | 6 | 0 | 2 | 0 | 0 | 950 | 0 | 0 | 953 | 862 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 84 | 8 | 1 | 0 | 2 | 1 | 0 | 145 | 0 | | 145 | 132 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 826 | 83 | 57 | 138 | | 2,950 | 2,944 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 1,263 | 126 | 744 | 11,582 | | 243,975 | 243,907 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 928 | 93 | 546 | 8,506 | | 179,182 | 179,131 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 185 | 47 | 913 | 2 | 460 | 4,181 | 703 | 371,883 | 21,451 | 3 | 823,358 | 787,926 |
| | | | | | | | | | | | | |
| Road Maintenance | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 176 | 0 | | 176 | 159 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 176 | 0 | 0 | 176 | 159 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | | 4 | 3 |
| Well Reclamation | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 110 | 0 | | 110 | 100 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Sub-total: Reclamation | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 114 | 0 | 0 | 114 | 103 |
| | | | | | | | | | | | | |
| Total Emissions | 371 | 87 | 1,325 | 11 | 607 | 4,401 | 725 | 419,580 | 21,451 | 4 | 871,212 | 831,219 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately | | | | | | | | | | | | |

## Table U.8. Leasable Minerals – Conventional Oil and Gas Development – Federal Wells (Alternative A – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 50 | 5 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment Combustive Emissions a | 22 | 22 | 402 | 9 | 109 | 30 | 3 | 46,562 | 0 | 0 | 46,718 | 42,261 |
| Well Completion Flaring | 1 | 1 | 6 | 0 | 34 | 189 | 19 | 7 | 0 | 0 | 7 | 6 |
| Commuting Vehicles - Construction | 84 | 9 | 3 | 0 | 3 | 1 | 0 | 839 | 0 | | 840 | 762 |
| Wind Erosion | 19 | 3 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 176 | 39 | 411 | 9 | 146 | 220 | 22 | 47,407 | 0 | 0 | 47,564 | 43,030 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 24 | 24 | 696 | 1 | 348 | 348 | 104 | 277,632 | 581 | 2 | 290,598 | 264,126 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 388 | 0 | 0 | 389 | 353 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 545 | 204 | 5,918 | 361 | | 13,496 | 12,948 |
| Station Visits - Operations | 53 | 5 | 1 | 0 | 3 | 1 | 0 | 183 | 0 | | 183 | 166 |
| Well Workover - Operations | 1 | 0 | 6 | 0 | 2 | 0 | 0 | 950 | 0 | 0 | 953 | 862 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 65 | 6 | 1 | 0 | 2 | 1 | 0 | 111 | 0 | | 111 | 101 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 636 | 64 | 44 | 106 | | 2,269 | 2,264 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 971 | 97 | 572 | 8,908 | | 187,631 | 187,578 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 713 | 71 | 420 | 6,542 | | 137,801 | 137,762 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 143 | 36 | 704 | 2 | 354 | 3,215 | 541 | 286,219 | 16,497 | 3 | 633,431 | 606,160 |
| | | | | | | | | | | | | |
| Road Maintenance | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 135 | 0 | | 135 | 123 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 135 | 0 | 0 | 135 | 123 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | | 3 | 3 |
| Well Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 84 | 0 | | 84 | 76 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Sub-total: Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 87 | 0 | 0 | 87 | 79 |
| | | | | | | | | | | | | |
| Total Emissions | 326 | 76 | 1,115 | 11 | 501 | 3,435 | 563 | 333,848 | 16,497 | 3 | 681,217 | 649,391 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately | | | | | | | | | | | | |

## Table U.9. Leasable Minerals – Conventional Oil and Gas Development – Federal Wells (Alternative B – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric Tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 42 | 4 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 18 | 17 | 322 | 7 | 87 | 24 | 2 | 37,272 | 0 | 0 | 37,397 | 33,830 |
| Well Completion Flaring | 1 | 0 | 5 | 0 | 27 | 151 | 15 | 5 | 0 | 0 | 5 | 5 |
| Commuting Vehicles - Construction | 68 | 7 | 3 | 0 | 3 | 1 | 0 | 676 | 0 | | 676 | 614 |
| Wind Erosion | 16 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 143 | 31 | 329 | 7 | 117 | 176 | 18 | 37,953 | 0 | 0 | 38,078 | 34,448 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 27 | 27 | 783 | 2 | 392 | 392 | 117 | 312,573 | 654 | 3 | 327,169 | 297,366 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 437 | 0 | 0 | 438 | 397 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 613 | 230 | 6,663 | 406 | | 15,194 | 14,578 |
| Station Visits - Operations | 60 | 6 | 1 | 0 | 3 | 1 | 0 | 206 | 0 | | 206 | 187 |
| Well Workover - Operations | 1 | 0 | 5 | 0 | 2 | 0 | 0 | 760 | 0 | 0 | 762 | 690 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 73 | 7 | 1 | 0 | 2 | 1 | 0 | 126 | 0 | | 126 | 114 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 716 | 72 | 50 | 119 | | 2,554 | 2,549 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 1,094 | 109 | 644 | 10,029 | | 211,245 | 211,185 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 803 | 80 | 473 | 7,365 | | 155,143 | 155,100 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 160 | 41 | 790 | 2 | 398 | 3,620 | 609 | 321,931 | 18,573 | 3 | 712,838 | 682,165 |
| | | | | | | | | | | | | |
| Road Maintenance | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 152 | 0 | | 152 | 138 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 152 | 0 | 0 | 152 | 138 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | | 3 | 3 |
| Well Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 95 | 0 | | 95 | 86 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric Tonnes** |
| Sub-total: Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 98 | 0 | 0 | 98 | 89 |
| | | | | | | | | | | | | |
| Total Emissions | 312 | 73 | 1,120 | 9 | 516 | 3,796 | 627 | 360,134 | 18,573 | 3 | 751,166 | 716,840 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately | | | | | | | | | | | | |

## Table U.10. Leasable Minerals – Conventional Oil and Gas Development – Federal Wells (Alternative B – 2027)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 42 | 4 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment Combustive Emissions a | 18 | 17 | 322 | 7 | 87 | 24 | 2 | 37,272 | 0 | 0 | 37,397 | 33,830 |
| Well Completion Flaring | 1 | 0 | 5 | 0 | 27 | 151 | 15 | 5 | 0 | 0 | 5 | 5 |
| Commuting Vehicles - Construction | 68 | 7 | 3 | 0 | 3 | 1 | 0 | 676 | 0 | | 676 | 614 |
| Wind Erosion | 16 | 2 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 143 | 31 | 329 | 7 | 117 | 176 | 18 | 37,953 | 0 | 0 | 38,078 | 34,448 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 21 | 21 | 602 | 1 | 301 | 301 | 90 | 240,129 | 502 | 2 | 251,343 | 228,447 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 336 | 0 | 0 | 337 | 305 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 471 | 177 | 5,119 | 312 | | 11,673 | 11,199 |
| Station Visits - Operations | 46 | 5 | 1 | 0 | 2 | 1 | 0 | 158 | 0 | | 158 | 143 |
| Well Workover - Operations | 1 | 0 | 5 | 0 | 2 | 0 | 0 | 760 | 0 | 0 | 762 | 690 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 56 | 6 | 1 | 0 | 1 | 1 | 0 | 96 | 0 | | 96 | 88 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 550 | 55 | 38 | 92 | | 1,962 | 1,959 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 840 | 84 | 495 | 7,704 | | 162,286 | 162,240 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 617 | 62 | 363 | 5,658 | | 119,187 | 119,153 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 123 | 31 | 608 | 1 | 306 | 2,781 | 468 | 247,494 | 14,268 | 2 | 547,803 | 524,222 |
| | | | | | | | | | | | | |
| Road Maintenance | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 117 | 0 | | 117 | 106 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 117 | 0 | 0 | 117 | 106 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | | 2 | 2 |
| Well Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 73 | 0 | | 73 | 66 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Sub-total: Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 75 | 0 | 0 | 75 | 68 |
| | | | | | | | | | | | | |
| Total Emissions | 273 | 63 | 938 | 9 | 424 | 2,957 | 485 | 285,639 | 14,269 | 3 | 586,074 | 558,845 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately | | | | | | | | | | | | |

## Table U.11. Leasable Minerals – Conventional Oil and Gas Development – Federal Wells (Alternative C – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 50 | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 22 | 22 | 402 | 9 | 109 | 30 | 3 | 46,562 | 0 | 0 | 46,718 | 42,261 |
| Well Completion Flaring | 1 | 1 | 6 | 0 | 34 | 189 | 19 | 7 | 0 | 0 | 7 | 6 |
| Commuting Vehicles - Construction | 84 | 9 | 3 | 0 | 3 | 1 | 0 | 839 | 0 | | 840 | 762 |
| Wind Erosion | 19 | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 176 | 39 | 411 | 9 | 146 | 220 | 22 | 47,407 | 0 | 0 | 47,564 | 43,030 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 31 | 31 | 906 | 2 | 453 | 453 | 136 | 361,813 | 757 | 3 | 378,709 | 344,210 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 506 | 0 | 0 | 507 | 459 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 710 | 266 | 7,713 | 470 | | 17,588 | 16,874 |
| Station Visits - Operations | 69 | 7 | 1 | 0 | 4 | 2 | 0 | 238 | 0 | | 238 | 216 |
| Well Workover - Operations | 1 | 0 | 6 | 0 | 2 | 0 | 0 | 950 | 0 | 0 | 953 | 862 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 84 | 8 | 1 | 0 | 2 | 1 | 0 | 145 | 0 | | 145 | 132 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 828 | 83 | 58 | 138 | | 2,956 | 2,951 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 1,266 | 127 | 746 | 11,608 | | 244,522 | 244,453 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 930 | 93 | 548 | 8,526 | | 179,583 | 179,533 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 186 | 47 | 915 | 2 | 461 | 4,190 | 705 | 372,715 | 21,499 | 3 | 825,202 | 789,691 |
| | | | | | | | | | | | | |
| Road Maintenance | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 176 | 0 | | 176 | 160 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 176 | 0 | 0 | 176 | 160 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | | 4 | 3 |
| Well Reclamation | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 110 | 0 | | 110 | 100 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Sub-total: Reclamation | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 114 | 0 | 0 | 114 | 103 |
| | | | | | | | | | | | | |
| Total Emissions | 371 | 87 | 1,328 | 11 | 608 | 4,410 | 727 | 420,412 | 21,499 | 4 | 873,057 | 832,984 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately | | | | | | | | | | | | |

## Table U.12. Leasable Minerals – Conventional Oil and Gas Development – Federal Wells (Alternative C – 2027)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 50 | 5 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment Combustive Emissions a | 22 | 22 | 402 | 9 | 109 | 30 | 3 | 46,562 | 0 | 0 | 46,718 | 42,261 |
| Well Completion Flaring | 1 | 1 | 6 | 0 | 34 | 189 | 19 | 7 | 0 | 0 | 7 | 6 |
| Commuting Vehicles - Construction | 84 | 9 | 3 | 0 | 3 | 1 | 0 | 839 | 0 | | 840 | 762 |
| Wind Erosion | 19 | 3 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 176 | 39 | 411 | 9 | 146 | 220 | 22 | 47,407 | 0 | 0 | 47,564 | 43,030 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 24 | 24 | 697 | 1 | 348 | 348 | 105 | 278,172 | 582 | 3 | 291,162 | 264,639 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 389 | 0 | 0 | 390 | 353 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 546 | 205 | 5,930 | 362 | | 13,522 | 12,973 |
| Station Visits - Operations | 53 | 5 | 1 | 0 | 3 | 1 | 0 | 183 | 0 | | 183 | 166 |
| Well Workover - Operations | 1 | 0 | 6 | 0 | 2 | 0 | 0 | 950 | 0 | 0 | 953 | 862 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 65 | 6 | 1 | 0 | 2 | 1 | 0 | 112 | 0 | | 112 | 101 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 637 | 64 | 44 | 106 | | 2,273 | 2,269 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 973 | 97 | 573 | 8,925 | | 187,996 | 187,943 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 715 | 71 | 421 | 6,555 | | 138,069 | 138,030 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 143 | 36 | 705 | 2 | 355 | 3,222 | 542 | 286,774 | 16,529 | 3 | 634,660 | 607,337 |
| | | | | | | | | | | | | |
| Road Maintenance | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 135 | 0 | | 135 | 123 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 135 | 0 | 0 | 135 | 123 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | | 3 | 3 |
| Well Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 84 | 0 | | 84 | 76 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Sub-total: Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 87 | 0 | 0 | 87 | 79 |
| | | | | | | | | | | | | |
| Total Emissions | 327 | 76 | 1,117 | 11 | 501 | 3,442 | 564 | 334,403 | 16,529 | 3 | 682,447 | 650,568 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately | | | | | | | | | | | | |

## Table U.13. Leasable Minerals – Conventional Oil and Gas Development – Federal Wells (Alternative D – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 48 | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 21 | 21 | 384 | 9 | 104 | 29 | 3 | 44,498 | 0 | 0 | 44,647 | 40,389 |
| Well Completion Flaring | 1 | 1 | 6 | 0 | 32 | 180 | 18 | 6 | 0 | 0 | 6 | 6 |
| Commuting Vehicles - Construction | 81 | 8 | 3 | 0 | 3 | 1 | 0 | 803 | 0 | | 804 | 730 |
| Wind Erosion | 19 | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 169 | 37 | 393 | 9 | 140 | 210 | 21 | 45,308 | 0 | 0 | 45,458 | 41,124 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 30 | 30 | 879 | 2 | 440 | 440 | 132 | 350,885 | 734 | 3 | 367,271 | 333,815 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 491 | 0 | 0 | 492 | 446 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 689 | 258 | 7,480 | 456 | | 17,057 | 16,364 |
| Station Visits - Operations | 67 | 7 | 1 | 0 | 4 | 2 | 0 | 231 | 0 | | 231 | 209 |
| Well Workover - Operations | 1 | 0 | 6 | 0 | 2 | 0 | 0 | 907 | 0 | 0 | 911 | 824 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 82 | 8 | 1 | 0 | 2 | 1 | 0 | 141 | 0 | | 141 | 128 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 803 | 80 | 56 | 134 | | 2,867 | 2,862 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 1,228 | 123 | 723 | 11,258 | | 237,138 | 237,071 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 902 | 90 | 531 | 8,268 | | 174,160 | 174,110 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 180 | 46 | 888 | 2 | 447 | 4,064 | 684 | 361,445 | 20,849 | 3 | 800,267 | 765,829 |
| | | | | | | | | | | | | |
| Road Maintenance | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 171 | 0 | | 171 | 155 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 171 | 0 | 0 | 171 | 155 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | | 4 | 3 |
| Well Reclamation | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 107 | 0 | | 107 | 97 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Sub-total: Reclamation | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 111 | 0 | 0 | 111 | 100 |
| | | | | | | | | | | | | |
| Total Emissions | 358 | 84 | 1,282 | 11 | 588 | 4,274 | 705 | 407,034 | 20,850 | 4 | 846,006 | 807,208 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately | | | | | | | | | | | | |

## Table U.14. Leasable Minerals – Conventional Oil and Gas Development – Federal Wells (Alternative D – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 48 | 5 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment Combustive Emissions a | 21 | 21 | 384 | 9 | 104 | 29 | 3 | 44,498 | 0 | 0 | 44,647 | 40,389 |
| Well Completion Flaring | 1 | 1 | 6 | 0 | 32 | 180 | 18 | 6 | 0 | 0 | 6 | 6 |
| Commuting Vehicles - Construction | 81 | 8 | 3 | 0 | 3 | 1 | 0 | 803 | 0 | | 804 | 730 |
| Wind Erosion | 19 | 3 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 169 | 37 | 393 | 9 | 140 | 210 | 21 | 45,308 | 0 | 0 | 45,458 | 41,124 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 23 | 23 | 676 | 1 | 338 | 338 | 101 | 269,808 | 564 | 2 | 282,408 | 256,682 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 377 | 0 | 0 | 378 | 343 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 530 | 199 | 5,752 | 351 | | 13,116 | 12,583 |
| Station Visits - Operations | 51 | 5 | 1 | 0 | 3 | 1 | 0 | 177 | 0 | | 177 | 161 |
| Well Workover - Operations | 1 | 0 | 6 | 0 | 2 | 0 | 0 | 907 | 0 | 0 | 911 | 824 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 63 | 6 | 1 | 0 | 2 | 1 | 0 | 108 | 0 | | 108 | 98 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 618 | 62 | 43 | 103 | | 2,205 | 2,201 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 944 | 94 | 556 | 8,657 | | 182,343 | 182,292 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 693 | 69 | 408 | 6,358 | | 133,917 | 133,880 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 139 | 35 | 684 | 2 | 344 | 3,125 | 526 | 278,137 | 16,032 | 2 | 615,563 | 589,063 |
| | | | | | | | | | | | | |
| Road Maintenance | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 131 | 0 | | 131 | 119 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 131 | 0 | 0 | 131 | 119 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | | 3 | 2 |
| Well Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 82 | 0 | | 82 | 74 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Sub-total: Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 84 | 0 | 0 | 84 | 76 |
| | | | | | | | | | | | | |
| Total Emissions | 315 | 73 | 1,077 | 10 | 484 | 3,335 | 547 | 323,661 | 16,032 | 3 | 661,237 | 630,382 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately | | | | | | | | | | | | |

## Table U.15. Leasable Minerals – CBNG Development – Federal Wells (Base Year – 2008)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 1 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 116 | 0 | 0 | 117 | 106 |
| Commuting Vehicles - Construction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | | 7 | 6 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 123 | 0 | 0 | 123 | 112 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 964 | 2 | 0 | 1,009 | 915 |
| Dehydrators | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 132 | 0 | 0 | 132 | 120 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 0 | 0 | 0 | 12 | | 244 | 221 |
| Pneumatics | --- | --- | --- | --- | --- | 0 | 0 | 6 | 91 | | 1,907 | 1,730 |
| Station Visits - Operations | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | | 3 | 3 |
| Well Workover - Operations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 8 | 8 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 2 | 0 | 3 | 0 | 2 | 2 | 0 | 2,104 | 104 | 0 | 4,296 | 3,898 |
| | | | | | | | | | | | | |
| Road Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Well Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 4 | 1 | 4 | 0 | 2 | 2 | 0 | 2,228 | 104 | 0 | 4,420 | 4,011 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.16. Leasable Minerals – CBNG Development – Federal Wells (Alternative A – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 10 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 5 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 1 | 1 | 20 | 1 | 7 | 2 | 0 | 2,718 | 0 | 0 | 2,726 | 2,474 |
| Commuting Vehicles - Construction | 10 | 1 | 1 | 0 | 1 | 0 | 0 | 149 | 0 | | 149 | 135 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 26 | 4 | 21 | 1 | 8 | 2 | 0 | 2,866 | 0 | 0 | 2,875 | 2,609 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 8 | 8 | 232 | 0 | 116 | 116 | 35 | 92,506 | 194 | 1 | 96,828 | 87,866 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 9 | 4 | 924 | 0 | 0 | 926 | 841 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 3 | 0 | 41 | 1,112 | | 23,401 | 21,235 |
| Pneumatics | --- | --- | --- | --- | --- | 43 | 4 | 556 | 8,689 | | 183,032 | 166,091 |
| Station Visits - Operations | 11 | 1 | 0 | 0 | 1 | 0 | 0 | 40 | 0 | | 40 | 36 |
| Well Workover - Operations | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 203 | 0 | 0 | 204 | 185 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | | 22 | 20 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 32 | 10 | 235 | 1 | 119 | 172 | 44 | 95,282 | 9,995 | 1 | 305,445 | 277,174 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 0 | | 31 | 28 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 31 | 28 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | | 19 | 17 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 20 | 18 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 60 | 15 | 256 | 1 | 126 | 173 | 44 | 98,200 | 9,995 | 1 | 308,372 | 279,829 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.17. Leasable Minerals – CBNG Development – Federal Wells (Alternative A – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 10 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 5 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 1 | 1 | 20 | 1 | 7 | 2 | 0 | 2,718 | 0 | 0 | 2,726 | 2,474 |
| Commuting Vehicles - Construction | 10 | 1 | 1 | 0 | 1 | 0 | 0 | 149 | 0 | | 149 | 135 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 26 | 4 | 21 | 1 | 8 | 2 | 0 | 2,866 | 0 | 0 | 2,875 | 2,609 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 7 | 7 | 209 | 0 | 104 | 104 | 31 | 83,255 | 174 | 1 | 87,145 | 79,079 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 8 | 4 | 792 | 0 | 0 | 794 | 720 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 3 | 0 | 37 | 1,001 | | 21,061 | 19,112 |
| Pneumatics | --- | --- | --- | --- | --- | 39 | 4 | 500 | 7,820 | | 164,729 | 149,482 |
| Station Visits - Operations | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | | 18 | 16 |
| Well Workover - Operations | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 203 | 0 | 0 | 204 | 185 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | | 19 | 18 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 29 | 9 | 212 | 0 | 107 | 154 | 39 | 85,817 | 8,996 | 1 | 274,963 | 249,513 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 0 | | 28 | 26 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 0 | 0 | 28 | 26 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | | 17 | 16 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 18 | 16 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 57 | 14 | 233 | 1 | 114 | 156 | 40 | 88,729 | 8,996 | 1 | 277,884 | 252,164 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.18. Leasable Minerals – CBNG Development – Federal Wells (Alternative B – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 2 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 1 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions | 0 | 0 | 4 | 0 | 1 | 0 | 0 | 569 | 0 | 0 | 571 | 518 |
| Commuting Vehicles - Construction | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 0 | | 31 | 29 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 6 | 1 | 4 | 0 | 2 | 0 | 0 | 601 | 0 | 0 | 603 | 547 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations | 2 | 2 | 45 | 0 | 22 | 22 | 7 | 17,923 | 37 | 0 | 18,760 | 17,024 |
| Dehydrators | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 264 | 0 | 0 | 265 | 240 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 1 | 0 | 8 | 216 | | 4,534 | 4,114 |
| Pneumatics | --- | --- | --- | --- | --- | 8 | 1 | 108 | 1,684 | | 35,463 | 32,180 |
| Station Visits - Operations | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | | 10 | 9 |
| Well Workover - Operations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 42 | 39 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | | 4 | 4 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 7 | 2 | 46 | 0 | 24 | 33 | 9 | 19,350 | 1,937 | 0 | 60,071 | 54,511 |
| | | | | | | | | | | | | |
| Road Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | | 6 | 6 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 6 | 6 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Well Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | | 4 | 3 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 3 |
| | | | | | | | | | | | | |
| Total Emissions | 13 | 3 | 51 | 0 | 25 | 34 | 9 | 19,960 | 1,937 | 0 | 60,683 | 55,066 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

## Table U.19. Leasable Minerals – CBNG Development – Federal Wells (Alternative B – 2027)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 2 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 1 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 0 | 0 | 4 | 0 | 1 | 0 | 0 | 569 | 0 | 0 | 571 | 518 |
| Commuting Vehicles - Construction | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 0 | | 31 | 29 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 6 | 1 | 4 | 0 | 2 | 0 | 0 | 601 | 0 | 0 | 603 | 547 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 1 | 1 | 41 | 0 | 20 | 20 | 6 | 16,189 | 34 | 0 | 16,945 | 15,376 |
| Dehydrators | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 264 | 0 | 0 | 265 | 240 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 1 | 0 | 7 | 195 | | 4,095 | 3,716 |
| Pneumatics | --- | --- | --- | --- | --- | 8 | 1 | 97 | 1,521 | | 32,031 | 29,066 |
| Station Visits - Operations | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | | 5 | 4 |
| Well Workover - Operations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 42 | 39 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | | 4 | 3 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 7 | 2 | 42 | 0 | 21 | 30 | 8 | 17,599 | 1,749 | 0 | 54,379 | 49,346 |
| | | | | | | | | | | | | |
| Road Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | | 5 | 5 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 5 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Well Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | | 3 | 3 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 3 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 13 | 3 | 46 | 0 | 23 | 30 | 8 | 18,208 | 1,749 | 0 | 54,991 | 49,901 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.20. Leasable Minerals – CBNG Development – Federal Wells (Alternative C – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 10 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 5 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions | 1 | 1 | 20 | 1 | 7 | 2 | 0 | 2,724 | 0 | 0 | 2,732 | 2,479 |
| Commuting Vehicles - Construction | 10 | 1 | 1 | 0 | 1 | 0 | 0 | 150 | 0 | | 150 | 136 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 27 | 4 | 21 | 1 | 8 | 2 | 0 | 2,874 | 0 | 0 | 2,882 | 2,615 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations | 8 | 8 | 234 | 0 | 117 | 117 | 35 | 93,277 | 195 | 1 | 97,635 | 88,598 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 9 | 4 | 924 | 0 | 0 | 926 | 841 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 3 | 0 | 42 | 1,122 | | 23,596 | 21,412 |
| Pneumatics | --- | --- | --- | --- | --- | 43 | 4 | 561 | 8,762 | | 184,558 | 167,475 |
| Station Visits - Operations | 12 | 1 | 0 | 0 | 1 | 0 | 0 | 43 | 0 | | 43 | 39 |
| Well Workover - Operations | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 203 | 0 | 0 | 204 | 185 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 13 | 1 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | | 22 | 20 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 33 | 11 | 237 | 1 | 120 | 173 | 44 | 96,062 | 10,079 | 1 | 307,976 | 279,470 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | | 32 | 29 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 32 | 29 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | | 19 | 18 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 20 | 18 |
| | | | | | | | | | | | | |
| Total Emissions | 61 | 15 | 258 | 1 | 127 | 175 | 44 | 98,987 | 10,079 | 1 | 310,910 | 282,132 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

## Table U.21. Leasable Minerals – CBNG Development – Federal Wells (Alternative C – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 10 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 5 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 1 | 1 | 20 | 1 | 7 | 2 | 0 | 2,724 | 0 | 0 | 2,732 | 2,479 |
| Commuting Vehicles - Construction | 10 | 1 | 1 | 0 | 1 | 0 | 0 | 150 | 0 | | 150 | 136 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 27 | 4 | 21 | 1 | 8 | 2 | 0 | 2,874 | 0 | 0 | 2,882 | 2,615 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 7 | 7 | 211 | 0 | 105 | 105 | 32 | 84,026 | 176 | 1 | 87,952 | 79,811 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 8 | 4 | 792 | 0 | 0 | 794 | 720 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 3 | 0 | 38 | 1,010 | | 21,256 | 19,289 |
| Pneumatics | --- | --- | --- | --- | --- | 39 | 4 | 505 | 7,893 | | 166,254 | 150,866 |
| Station Visits - Operations | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | | 18 | 16 |
| Well Workover - Operations | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 203 | 0 | 0 | 204 | 185 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | | 20 | 18 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 29 | 9 | 214 | 0 | 107 | 156 | 40 | 86,593 | 9,079 | 1 | 277,491 | 251,806 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 0 | | 29 | 26 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 29 | 26 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | | 17 | 16 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 18 | 16 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 57 | 14 | 235 | 1 | 115 | 158 | 40 | 89,513 | 9,079 | 1 | 280,419 | 254,464 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.22. Leasable Minerals – CBNG Development – Federal Wells (Alternative D – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 8 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 4 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions | 1 | 1 | 17 | 0 | 6 | 1 | 0 | 2,271 | 0 | 0 | 2,278 | 2,067 |
| Commuting Vehicles - Construction | 9 | 1 | 0 | 0 | 1 | 0 | 0 | 125 | 0 | | 125 | 113 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 22 | 3 | 18 | 0 | 6 | 2 | 0 | 2,396 | 0 | 0 | 2,403 | 2,181 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations | 7 | 7 | 196 | 0 | 98 | 98 | 29 | 78,245 | 164 | 1 | 81,900 | 74,320 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 7 | 4 | 792 | 0 | 0 | 794 | 720 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 3 | 0 | 35 | 941 | | 19,794 | 17,962 |
| Pneumatics | --- | --- | --- | --- | --- | 36 | 4 | 470 | 7,350 | | 154,815 | 140,485 |
| Station Visits - Operations | 11 | 1 | 0 | 0 | 1 | 0 | 0 | 36 | 0 | | 36 | 33 |
| Well Workover - Operations | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 169 | 0 | 0 | 170 | 154 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | | 18 | 17 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 28 | 9 | 199 | 0 | 100 | 145 | 37 | 80,756 | 8,454 | 1 | 258,520 | 234,591 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | | 27 | 24 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 27 | 24 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | | 16 | 15 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 17 | 15 |
| | | | | | | | | | | | | |
| Total Emissions | 52 | 12 | 217 | 1 | 107 | 147 | 37 | 83,196 | 8,454 | 1 | 260,966 | 236,811 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

## Table U.23. Leasable Minerals – CBNG Development – Federal Wells (Alternative D – 2027)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 8 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 4 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 1 | 1 | 17 | 0 | 6 | 1 | 0 | 2,271 | 0 | 0 | 2,278 | 2,067 |
| Commuting Vehicles - Construction | 9 | 1 | 0 | 0 | 1 | 0 | 0 | 125 | 0 | | 125 | 113 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 22 | 3 | 18 | 0 | 6 | 2 | 0 | 2,396 | 0 | 0 | 2,403 | 2,181 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 6 | 6 | 176 | 0 | 88 | 88 | 26 | 70,343 | 147 | 1 | 73,629 | 66,814 |
| Dehydrators | 0 | 0 | 1 | 0 | 0 | 7 | 3 | 660 | 0 | 0 | 662 | 600 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 2 | 0 | 31 | 846 | | 17,795 | 16,148 |
| Pneumatics | --- | --- | --- | --- | --- | 33 | 3 | 423 | 6,608 | | 139,181 | 126,298 |
| Station Visits - Operations | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | | 17 | 15 |
| Well Workover - Operations | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 169 | 0 | 0 | 170 | 154 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | | 16 | 15 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 25 | 8 | 179 | 0 | 90 | 130 | 33 | 72,650 | 7,601 | 1 | 232,462 | 210,946 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | | 24 | 22 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 24 | 22 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Well Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | | 15 | 13 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 15 | 14 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 49 | 12 | 196 | 1 | 96 | 132 | 33 | 75,085 | 7,601 | 1 | 234,904 | 213,162 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.24. Locatable Minerals – Bentonite Mining (Base Year – 2008)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 101 | 11 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 0 | 61 | 56 |
| Product Handling, Transfer, and Storage | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Unpaved Roads | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting - Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Heavy Equipment - Dust | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment - Combustive | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Total | 101 | 11 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 0 | 61 | 56 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

## Table U.25. Locatable Minerals – Bentonite Mining (Alternative A – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 101 | 11 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 0 | 61 | 56 |
| Product Handling, Transfer, and Storage | 374 | 40 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Unpaved Roads | 65 | 6 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting - Exhaust | 0 | 0 | 2 | 0 | 9 | 1 | 0 | 689 | 0 | | 690 | 626 |
| Heavy Equipment - Dust | 1 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment - Combustive | 1 | 1 | 8 | 0 | 3 | 1 | 0 | 2,391 | 0 | | 2,392 | 2,170 |
| Total | 542 | 59 | 10 | 0 | 12 | 2 | 0 | 3,141 | 0 | 0 | 3,143 | 2,852 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

**Table U.26. Locatable Minerals – Bentonite Mining (Alternative A – 2027)**

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 101 | 11 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 0 | 61 | 56 |
| Product Handling, Transfer, and Storage | 374 | 40 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Unpaved Roads | 65 | 6 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting - Exhaust | 0 | 0 | 2 | 0 | 9 | 1 | 0 | 689 | 0 | | 690 | 626 |
| Heavy Equipment - Dust | 1 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment - Combustive | 1 | 1 | 2 | 0 | 1 | 1 | 0 | 2,392 | 0 | | 2,392 | 2,170 |
| Total | 542 | 59 | 5 | 0 | 10 | 1 | 0 | 3,142 | 0 | 0 | 3,143 | 2,852 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

## Table U.27. Locatable Minerals – Bentonite Mining (Alternative B – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Product Handling, Transfer, and Storage | 125 | 13 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Unpaved Roads | 22 | 2 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting - Exhaust | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 230 | 0 | | 230 | 209 |
| Heavy Equipment - Dust | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment - Combustive | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 797 | 0 | | 797 | 723 |
| Total | 147 | 16 | 3 | 0 | 4 | 1 | 0 | 1,027 | 0 | 0 | 1,027 | 932 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

## Table U.28. Locatable Minerals – Bentonite Mining (Alternative B – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Product Handling, Transfer, and Storage | 125 | 13 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Unpaved Roads | 22 | 2 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting - Exhaust | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 230 | 0 | | 230 | 209 |
| Heavy Equipment - Dust | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment - Combustive | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 797 | 0 | | 797 | 723 |
| Total | 147 | 16 | 1 | 0 | 3 | 0 | 0 | 1,027 | 0 | 0 | 1,027 | 932 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

## Table U.29. Locatable Minerals – Bentonite Mining (Alternative C – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 101 | 11 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 0 | 61 | 56 |
| Product Handling, Transfer, and Storage | 374 | 40 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Unpaved Roads | 65 | 6 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting - Exhaust | 0 | 0 | 2 | 0 | 9 | 1 | 0 | 689 | 0 | | 690 | 626 |
| Heavy Equipment - Dust | 1 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment - Combustive | 1 | 1 | 8 | 0 | 3 | 1 | 0 | 2,391 | 0 | | 2,392 | 2,170 |
| Total | 542 | 59 | 10 | 0 | 12 | 2 | 0 | 3,141 | 0 | 0 | 3,143 | 2,852 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

## Table U.30. Locatable Minerals – Bentonite Mining (Alternative C – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 101 | 11 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 0 | 61 | 56 |
| Product Handling, Transfer, and Storage | 374 | 40 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Unpaved Roads | 65 | 6 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting - Exhaust | 0 | 0 | 2 | 0 | 9 | 1 | 0 | 689 | 0 | | 690 | 626 |
| Heavy Equipment - Dust | 1 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment - Combustive | 1 | 1 | 2 | 0 | 1 | 1 | 0 | 2,392 | 0 | | 2,392 | 2,170 |
| Total | 542 | 59 | 5 | 0 | 10 | 1 | 0 | 3,142 | 0 | 0 | 3,143 | 2,852 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

## Table U.31. Locatable Minerals – Bentonite Mining (Alternative D – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 101 | 11 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 0 | 61 | 56 |
| Product Handling, Transfer, and Storage | 249 | 27 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Unpaved Roads | 43 | 4 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting - Exhaust | 0 | 0 | 1 | 0 | 6 | 0 | 0 | 459 | 0 | | 460 | 417 |
| Heavy Equipment - Dust | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment - Combustive | 1 | 1 | 5 | 0 | 2 | 1 | 0 | 1,594 | 0 | | 1,594 | 1,447 |
| Total | 395 | 43 | 7 | 0 | 8 | 1 | 0 | 2,115 | 0 | 0 | 2,116 | 1,920 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

**Table U.32. Locatable Minerals – Bentonite Mining (Alternative D – 2027)**

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 101 | 11 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 0 | 61 | 56 |
| Product Handling, Transfer, and Storage | 249 | 27 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Unpaved Roads | 43 | 4 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting - Exhaust | 0 | 0 | 1 | 0 | 6 | 0 | 0 | 459 | 0 | | 460 | 417 |
| Heavy Equipment - Dust | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment - Combustive | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1,594 | 0 | | 1,595 | 1,447 |
| Total | 395 | 43 | 3 | 0 | 7 | 1 | 0 | 2,115 | 0 | 0 | 2,116 | 1,920 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

## Table U.33. Locatable Minerals – Gold Mining (Base Year – 2008)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ a | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 0 | 0 | 37 | 34 |
| Mine Development | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Heavy Equipment - Combustive | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Total | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 0 | 0 | 37 | 34 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

## Table U.34. Locatable Minerals – Gold Mining (All Alternatives – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ a | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 5 | 1 | 1 | 0 | 1 | 0 | 0 | 149 | 0 | 0 | 150 | 137 |
| Mine Development | 220 | 67 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 88 | 9 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 396 | 0 | | 396 | 359 |
| Heavy Equipment - Combustive | 1 | 1 | 6 | 0 | 2 | 1 | 0 | 1,865 | 0 | | 1,865 | 1,693 |
| Total | 314 | 77 | 8 | 0 | 5 | 1 | 0 | 2,410 | 0 | 0 | 2,412 | 2,188 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

## Table U.35. Locatable Minerals – Gold Mining (All Alternatives – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ a | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Exploratory Operations | 5 | 1 | 1 | 0 | 1 | 0 | 0 | 149 | 0 | 0 | 150 | 136 |
| Mine Development | 216 | 66 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 88 | 9 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 396 | 0 | | 396 | 359 |
| Heavy Equipment - Combustive | 1 | 1 | 6 | 0 | 2 | 1 | 0 | 1,865 | 0 | | 1,865 | 1,693 |
| Total | 310 | 76 | 8 | 0 | 5 | 1 | 0 | 2,410 | 0 | 0 | 2,411 | 2,188 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

## Table U.36. Locatable Minerals – Uranium Mining (Base Year – 2008)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| | | | | | | | | | | | | |
| Well Pad & Station Construction - Fugitive Dust | 1 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions | 2 | 2 | 28 | 1 | 11 | 3 | 0 | 634 | 0 | 0 | 637 | 578 |
| Wind Erosion | 1 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Construction | 12 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | --- | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 15 | 3 | 28 | 1 | 12 | 3 | 0 | 634 | 0 | 0 | 637 | 578 |
| | | | | | | | | | | | | |
| Transport of Ion Exchange Resin | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Well Workover - Operations | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 114 | 0 | 0 | 114 | 103 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 10 | 1 | 1 | 0 | 0 | 0 | 0 | 114 | 0 | 0 | 114 | 104 |
| | | | | | | | | | | | | |
| Road Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Well Pad Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | | 4 | 4 |
| Sub-total: Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 4 |
| | | | | | | | | | | | | |
| Total Emissions | 25 | 4 | 30 | 1 | 13 | 3 | 0 | 752 | 0 | 0 | 755 | 685 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1 | | | | | | | | | | | | |

## Table U.37. Locatable Minerals – Uranium Mining (All Alternatives – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| | | | | | | | | | | | | |
| Well Pad Construction - Fugitive Dust | 2 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions | 9 | 9 | 117 | 3 | 45 | 10 | 1 | 2,620 | 0 | 0 | 2,626 | 2,383 |
| Wind Erosion | 2 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Construction | 50 | 5 | 1 | 0 | 6 | 0 | 0 | 0 | 0 | --- | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 64 | 14 | 118 | 3 | 51 | 11 | 1 | 2,620 | 0 | 0 | 2,626 | 2,383 |
| | | | | | | | | | | | | |
| Transport of Ion Exchange Resin | 142 | 14 | 2 | 0 | 1 | 1 | 0 | 2,370 | 0 | | 2,372 | 2,152 |
| Well Workover - Operations | 43 | 5 | 8 | 0 | 2 | 1 | 0 | 2,198 | 0 | 0 | 2,205 | 2,001 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | | 5 | 4 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 187 | 19 | 10 | 0 | 4 | 1 | 0 | 4,573 | 0 | 0 | 4,582 | 4,158 |
| | | | | | | | | | | | | |
| Road Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | | 5 | 5 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 5 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Well Pad Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 80 | 0 | | 80 | 72 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 80 | 0 | 0 | 80 | 72 |
| | | | | | | | | | | | | |
| Total Emissions | 254 | 34 | 128 | 3 | 55 | 12 | 1 | 7,278 | 1 | 0 | 7,293 | 6,618 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1

## Table U.38. Locatable Minerals – Uranium Mining (All Alternatives – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| | | | | | | | | | | | | |
| Well Pad & Station Construction - Fugitive Dust | 2 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions | 9 | 9 | 117 | 3 | 45 | 10 | 1 | 2,620 | 0 | 0 | 2,626 | 2,383 |
| Wind Erosion | 2 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Construction | 50 | 5 | 1 | 0 | 6 | 0 | 0 | 0 | 0 | --- | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 64 | 14 | 118 | 3 | 51 | 11 | 1 | 2,620 | 0 | 0 | 2,626 | 2,383 |
| | | | | | | | | | | | | |
| Transport of Ion Exchange Resin | 85 | 9 | 1 | 0 | 1 | 1 | 0 | 2,371 | 0 | | 2,373 | 2,153 |
| Well Workover - Operations | 25 | 3 | 1 | 0 | 0 | 0 | 0 | 1,310 | 0 | 0 | 1,315 | 1,193 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | | 3 | 3 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 112 | 11 | 2 | 0 | 1 | 1 | 0 | 3,685 | 0 | 0 | 3,691 | 3,349 |
| | | | | | | | | | | | | |
| Road Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | | 3 | 3 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 3 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Well Pad Reclamation | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 47 | 0 | | 47 | 43 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 47 | 43 |
| | | | | | | | | | | | | |
| Total Emissions | 177 | 26 | 120 | 3 | 52 | 12 | 1 | 6,355 | 0 | 0 | 6,367 | 5,777 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1

## Table U.39. Salable Minerals – Sand & Gravel (Base Year – 2008)

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$a | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $CO_{2eq}$ | $CO_{2eq}$-metric tonnes |
| Product Handling, Transfer, and Storage | 2 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 234 | 23 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 4 | 0 | 5 | 2 | 0 | 1,028 | 0 | 1,029 | 934 |
| Heavy Equipment - Dust | 10 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Combustive | 11 | 10 | 170 | 4 | 76 | 11 | 1 | 17,704 | 0 | 17,707 | 16,068 |
| Wind Erosion | 24 | 4 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total | 282 | 39 | 174 | 4 | 81 | 13 | 1 | 18,732 | 0 | 18,736 | 17,002 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.40. Salable Minerals – Sand & Gravel (Alternative A – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Product Handling, Transfer, and Storage | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 276 | 28 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 5 | 0 | 6 | 2 | 0 | 1,210 | 0 | 1,211 | 1,099 |
| Heavy Equipment - Dust | 13 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Combustive | 7 | 7 | 74 | 4 | 33 | 7 | 1 | 21,151 | 0 | 21,153 | 19,195 |
| Wind Erosion | 31 | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total | 330 | 41 | 79 | 4 | 39 | 9 | 1 | 22,361 | 0 | 22,364 | 20,294 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

## Table U.41. Salable Minerals – Sand & Gravel (Alternative A – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Product Handling, Transfer, and Storage | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 276 | 28 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 5 | 0 | 6 | 2 | 0 | 1,210 | 0 | 1,211 | 1,099 |
| Heavy Equipment - Dust | 13 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Combustive | 6 | 5 | 23 | 3 | 11 | 6 | 1 | 21,155 | 0 | 21,157 | 19,199 |
| Wind Erosion | 15 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total | 313 | 37 | 27 | 3 | 17 | 8 | 1 | 22,365 | 0 | 22,368 | 20,298 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.42. Salable Minerals – Sand & Gravel (Alternative B – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Product Handling, Transfer, and Storage | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 265 | 26 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 5 | 0 | 6 | 2 | 0 | 1,162 | 0 | 1,163 | 1,055 |
| Heavy Equipment - Dust | 13 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Combustive | 7 | 7 | 72 | 4 | 32 | 7 | 1 | 20,304 | 0 | 20,307 | 18,427 |
| Wind Erosion | 31 | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total | 319 | 40 | 76 | 4 | 38 | 9 | 1 | 21,466 | 0 | 21,469 | 19,482 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

## Table U.43. Salable Minerals – Sand & Gravel (Alternative B – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Product Handling, Transfer, and Storage | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 265 | 26 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 5 | 0 | 6 | 2 | 0 | 1,162 | 0 | 1,163 | 1,055 |
| Heavy Equipment - Dust | 13 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Combustive | 5 | 5 | 22 | 3 | 11 | 6 | 1 | 20,309 | 0 | 20,311 | 18,431 |
| Wind Erosion | 15 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total | 301 | 36 | 26 | 3 | 16 | 8 | 1 | 21,471 | 0 | 21,473 | 19,486 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.44. Salable Minerals – Sand & Gravel (Alternative C – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Product Handling, Transfer, and Storage | 4 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 331 | 33 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 6 | 0 | 7 | 3 | 0 | 1,452 | 0 | 1,453 | 1,319 |
| Heavy Equipment - Dust | 13 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Combustive | 9 | 9 | 89 | 5 | 40 | 9 | 1 | 25,381 | 0 | 25,383 | 23,034 |
| Wind Erosion | 31 | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total | 387 | 49 | 95 | 5 | 47 | 11 | 1 | 26,833 | 0 | 26,837 | 24,353 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

## Table U.45. Salable Minerals – Sand & Gravel (Alternative C – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Product Handling, Transfer, and Storage | 3 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 331 | 33 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 6 | 0 | 7 | 3 | 0 | 1,452 | 0 | 1,453 | 1,319 |
| Heavy Equipment - Dust | 13 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Combustive | 7 | 6 | 27 | 4 | 14 | 7 | 1 | 25,386 | 0 | 25,388 | 23,038 |
| Wind Erosion | 15 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total | 370 | 44 | 33 | 4 | 21 | 9 | 1 | 26,838 | 0 | 26,842 | 24,357 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.46. Salable Minerals – Sand & Gravel (Alternative D – 2018)**

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Product Handling, Transfer, and Storage | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 276 | 28 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 5 | 0 | 6 | 2 | 0 | 1,210 | 0 | 1,211 | 1,099 |
| Heavy Equipment - Dust | 13 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Combustive | 7 | 7 | 74 | 4 | 33 | 7 | 1 | 21,151 | 0 | 21,153 | 19,195 |
| Wind Erosion | 31 | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total | 330 | 41 | 79 | 4 | 39 | 9 | 1 | 22,361 | 0 | 22,364 | 20,294 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

## Table U.47. Salable Minerals – Sand & Gravel (Alternative D – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Product Handling, Transfer, and Storage | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Unpaved Roads | 276 | 28 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting - Exhaust | 0 | 0 | 5 | 0 | 6 | 2 | 0 | 1,210 | 0 | 1,211 | 1,099 |
| Heavy Equipment - Dust | 13 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Combustive | 6 | 5 | 23 | 3 | 11 | 6 | 1 | 21,155 | 0 | 21,157 | 19,199 |
| Wind Erosion | 15 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total | 313 | 37 | 27 | 3 | 17 | 8 | 1 | 22,365 | 0 | 22,368 | 20,298 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.48. Fire Management and Ecology (Base Year – 2008)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust and Smoke | 65 | 29 | 8 | 2 | 270 | 14 | 1 | 0 | 14 | 2 | 942 | 855 |
| Heavy Equipment Exhaust | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 23 | 0 | | 23 | 21 |
| Commuting Vehicles - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | | 20 | 18 |
| Total | 71 | 30 | 8 | 2 | 271 | 14 | 1 | 44 | 14 | 2 | 985 | 894 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

## Table U.49. Fire Management and Ecology (Alternative A – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust and Smoke | 50 | 27 | 8 | 2 | 270 | 14 | 1 | 0 | 14 | 2 | 942 | 855 |
| Heavy Equipment Exhaust | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 19 | 0 | | 19 | 17 |
| Commuting Vehicles - Fugitive Dust | 5 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | | 18 | 16 |
| Total | 55 | 27 | 8 | 2 | 271 | 14 | 1 | 37 | 14 | 2 | 978 | 888 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

**Table U.50. Fire Management and Ecology (Alternative A – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust and Smoke | 50 | 27 | 8 | 2 | 270 | 14 | 1 | 0 | 14 | 2 | 942 | 855 |
| Heavy Equipment Exhaust | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 19 | 0 | | 19 | 17 |
| Commuting Vehicles - Fugitive Dust | 5 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | | 18 | 16 |
| Total | 55 | 27 | 8 | 2 | 271 | 14 | 1 | 37 | 14 | 2 | 978 | 888 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

## Table U.51. Fire Management and Ecology (Alternative B – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust and Smoke | 161 | 88 | 25 | 7 | 899 | 46 | 5 | 0 | 48 | 7 | 3,139 | 2,849 |
| Heavy Equipment Exhaust | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 67 | 0 | | 68 | 61 |
| Commuting Vehicles - Fugitive Dust | 17 | 2 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | | 62 | 56 |
| Total | 178 | 90 | 25 | 7 | 902 | 47 | 5 | 129 | 48 | 7 | 3,268 | 2,966 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

**Table U.52. Fire Management and Ecology (Alternative B – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust and Smoke | 161 | 88 | 25 | 7 | 899 | 46 | 5 | 0 | 48 | 7 | 3,139 | 2,849 |
| Heavy Equipment Exhaust | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 67 | 0 | | 68 | 61 |
| Commuting Vehicles - Fugitive Dust | 17 | 2 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | | 62 | 56 |
| Total | 178 | 90 | 25 | 7 | 902 | 47 | 5 | 129 | 48 | 7 | 3,268 | 2,966 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

## Table U.53. Fire Management and Ecology (Alternative C – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust and Smoke | 50 | 27 | 8 | 2 | 270 | 14 | 1 | 0 | 14 | 2 | 942 | 855 |
| Heavy Equipment Exhaust | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 32 | 0 | | 32 | 29 |
| Commuting Vehicles - Fugitive Dust | 7 | 1 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | | 25 | 22 |
| Total | 58 | 28 | 8 | 2 | 271 | 14 | 1 | 57 | 14 | 2 | 999 | 906 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

**Table U.54. Fire Management and Ecology (Alternative C – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust and Smoke | 50 | 27 | 8 | 2 | 270 | 14 | 1 | 0 | 14 | 2 | 942 | 855 |
| Heavy Equipment Exhaust | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 32 | 0 | | 32 | 29 |
| Commuting Vehicles - Fugitive Dust | 7 | 1 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | | 25 | 22 |
| Total | 58 | 28 | 8 | 2 | 271 | 14 | 1 | 57 | 14 | 2 | 999 | 906 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

## Table U.55. Fire Management and Ecology (Alternative D – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust and Smoke | 70 | 43 | 13 | 3 | 450 | 23 | 2 | 0 | 24 | 3 | 1,570 | 1,424 |
| Heavy Equipment Exhaust | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 19 | 0 | | 19 | 17 |
| Commuting Vehicles - Fugitive Dust | 5 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | | 18 | 16 |
| Total | 75 | 43 | 13 | 3 | 450 | 23 | 2 | 37 | 24 | 3 | 1,606 | 1,458 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | | |

**Table U.56. Fire Management and Ecology (Alternative D – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust and Smoke | 70 | 43 | 13 | 3 | 450 | 23 | 2 | 0 | 24 | 3 | 1,570 | 1,424 |
| Heavy Equipment Exhaust | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 19 | 0 | | 19 | 17 |
| Commuting Vehicles - Fugitive Dust | 5 | 0 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | | 18 | 16 |
| Total | 75 | 43 | 13 | 3 | 450 | 23 | 2 | 37 | 24 | 3 | 1,606 | 1,458 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

## Table U.57. Vegetation – Forest and Woodlands (Base Year – 2008)

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$ tons** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 32 | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Sub-total: Heavy Equipment | 32 | 3 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Commuting Vehicles - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Sub-total: Commuting Vehicles | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Total | 38 | 4 | 0 | 0 | 5 | 1 | 0 | 47 | 0 | 47 | 42 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.58. Vegetation – Forest and Woodlands (Alternative A – 2018)**

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | CO2 | $CH_4$ | $CO_{2eq}$ tons | $CO_{2eq}$ metric tonnes |
| Heavy Equipment - Fugitive Dust | 131 | 13 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Sub-total: Heavy Equipment | 131 | 13 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Commuting Vehicles - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Sub-total: Commuting Vehicles | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Total | 138 | 14 | 0 | 0 | 5 | 1 | 0 | 47 | 0 | 47 | 42 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.59. Vegetation – Forest and Woodlands (Alternative A – 2027)

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$ tons** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 131 | 13 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Sub-total: Heavy Equipment | 131 | 13 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Commuting Vehicles - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Sub-total: Commuting Vehicles | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Total | 138 | 14 | 0 | 0 | 5 | 1 | 0 | 47 | 0 | 47 | 42 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.60. Vegetation – Forest and Woodlands (Alternative B – 2018)**

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | CO2 | $CH_4$ | $CO_{2eq}$ tons | $CO_{2eq}$ metric tonnes |
| Heavy Equipment - Fugitive Dust | 193 | 19 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Sub-total: Heavy Equipment | 193 | 19 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Commuting Vehicles - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Sub-total: Commuting Vehicles | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Total | 199 | 20 | 0 | 0 | 5 | 1 | 0 | 47 | 0 | 47 | 42 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.61. Vegetation – Forest and Woodlands (Alternative B – 2027)

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$ tons** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 193 | 19 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Sub-total: Heavy Equipment | 193 | 19 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Commuting Vehicles - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Sub-total: Commuting Vehicles | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Total | 199 | 20 | 0 | 0 | 5 | 1 | 0 | 47 | 0 | 47 | 42 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.62. Vegetation – Forest and Woodlands (Alternative C – 2018)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$ tons** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 263 | 26 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Sub-total: Heavy Equipment | 263 | 26 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Commuting Vehicles - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Sub-total: Commuting Vehicles | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Total | 269 | 27 | 0 | 0 | 5 | 1 | 0 | 47 | 0 | 47 | 42 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.63. Vegetation – Forest and Woodlands (Alternative C – 2027)

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$ tons** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 263 | 26 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Sub-total: Heavy Equipment | 263 | 26 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Commuting Vehicles - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Sub-total: Commuting Vehicles | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Total | 269 | 27 | 0 | 0 | 5 | 1 | 0 | 47 | 0 | 47 | 42 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.64. Vegetation – Forest and Woodlands (Alternative D – 2018)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$ tons** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 210 | 21 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Sub-total: Heavy Equipment | 210 | 21 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Commuting Vehicles - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Sub-total: Commuting Vehicles | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Total | 217 | 22 | 0 | 0 | 5 | 1 | 0 | 47 | 0 | 47 | 42 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.65. Vegetation – Forest and Woodlands (Alternative D – 2027)

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$ tons** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 210 | 21 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Sub-total: Heavy Equipment | 210 | 21 | 0 | 0 | 5 | 1 | 0 | 26 | 0 | 27 | 24 |
| Commuting Vehicles - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Sub-total: Commuting Vehicles | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 18 |
| Total | 217 | 22 | 0 | 0 | 5 | 1 | 0 | 47 | 0 | 47 | 42 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.66. Land Resources – Renewable Energy, Rights-of-Way, Corridors (Base Year – 2008)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust | 10 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 189 | 0 | 189 | 171 |
| Sub-total: Heavy Equipment | 10 | 1 | 2 | 0 | 1 | 0 | 0 | 189 | 0 | 189 | 171 |
| Commuting Vehicles - Fugitive Dust | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 13 | 12 |
| Sub-total: Commuting Vehicles | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 13 | 12 |
| Total | 13 | 1 | 2 | 0 | 1 | 0 | 0 | 202 | 0 | 202 | 183 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.67. Land Resources – Renewable Energy, Rights-of-Way, Corridors (Alternative A – 2018)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 37 | 4 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 504 | 0 | 504 | 457 |
| Sub-total: Heavy Equipment | 37 | 4 | 2 | 0 | 1 | 0 | 0 | 504 | 0 | 504 | 457 |
| Commuting Vehicles - Fugitive Dust | 8 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 0 | 39 | 36 |
| Sub-total: Commuting Vehicles | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 39 | 0 | 39 | 36 |
| Total | 45 | 5 | 2 | 0 | 1 | 0 | 0 | 543 | 0 | 543 | 493 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.68. Land Resources – Renewable Energy, Rights-of-Way, Corridors (Alternative A – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust | 37 | 4 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 514 | 0 | 514 | 466 |
| Sub-total: Heavy Equipment | 37 | 4 | 1 | 0 | 0 | 0 | 0 | 514 | 0 | 514 | 466 |
| Commuting Vehicles - Fugitive Dust | 8 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 0 | 39 | 36 |
| Sub-total: Commuting Vehicles | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 39 | 0 | 39 | 36 |
| Total | 45 | 5 | 1 | 0 | 1 | 0 | 0 | 553 | 0 | 553 | 502 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.69. Land Resources – Renewable Energy, Rights-of-Way, Corridors (Alternative B – 2018)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 16 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 218 | 0 | 218 | 198 |
| Sub-total: Heavy Equipment | 16 | 2 | 1 | 0 | 0 | 0 | 0 | 218 | 0 | 218 | 198 |
| Commuting Vehicles - Fugitive Dust | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 13 | 12 |
| Sub-total: Commuting Vehicles | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 13 | 12 |
| Total | 19 | 2 | 1 | 0 | 1 | 0 | 0 | 231 | 0 | 231 | 210 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.70. Land Resources – Renewable Energy, Rights-of-Way, Corridors (Alternative B – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust | 16 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 220 | 0 | 220 | 200 |
| Sub-total: Heavy Equipment | 16 | 2 | 0 | 0 | 0 | 0 | 0 | 220 | 0 | 220 | 200 |
| Commuting Vehicles - Fugitive Dust | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 13 | 12 |
| Sub-total: Commuting Vehicles | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 13 | 12 |
| Total | 19 | 2 | 0 | 0 | 0 | 0 | 0 | 233 | 0 | 233 | 212 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.71. Land Resources – Renewable Energy, Rights-of-Way, Corridors (Alternative C – 2018)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 408 | 41 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 2 | 2 | 25 | 1 | 11 | 2 | 0 | 6195 | 0 | 6196 | 5623 |
| Sub-total: Heavy Equipment | 411 | 43 | 25 | 1 | 11 | 2 | 0 | 6195 | 0 | 6196 | 5623 |
| Commuting Vehicles - Fugitive Dust | 129 | 13 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 779 | 0 | 779 | 707 |
| Sub-total: Commuting Vehicles | 129 | 13 | 1 | 0 | 3 | 1 | 0 | 779 | 0 | 779 | 707 |
| Total | 539 | 56 | 26 | 1 | 14 | 4 | 0 | 6974 | 0 | 6976 | 6330 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.72. Land Resources – Renewable Energy, Rights-of-Way, Corridors (Alternative C – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust | 408 | 41 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 2 | 2 | 7 | 1 | 3 | 2 | 0 | 6203 | 0 | 6204 | 5629 |
| Sub-total: Heavy Equipment | 410 | 42 | 7 | 1 | 3 | 2 | 0 | 6203 | 0 | 6204 | 5629 |
| Commuting Vehicles - Fugitive Dust | 129 | 13 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 779 | 0 | 779 | 707 |
| Sub-total: Commuting Vehicles | 129 | 13 | 1 | 0 | 3 | 1 | 0 | 779 | 0 | 779 | 707 |
| Total | 539 | 55 | 9 | 1 | 6 | 3 | 0 | 6982 | 0 | 6983 | 6337 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.73. Land Resources – Renewable Energy, Rights-of-Way, Corridors (Alternative D – 2018)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 30 | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 418 | 0 | 418 | 379 |
| Sub-total: Heavy Equipment | 31 | 3 | 2 | 0 | 1 | 0 | 0 | 418 | 0 | 418 | 379 |
| Commuting Vehicles - Fugitive Dust | 7 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 0 | 34 | 31 |
| Sub-total: Commuting Vehicles | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 34 | 0 | 34 | 31 |
| Total | 37 | 4 | 2 | 0 | 1 | 0 | 0 | 452 | 0 | 452 | 410 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.74. Land Resources – Renewable Energy, Rights-of-Way, Corridors (Alternative D – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **CO2** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Fugitive Dust | 30 | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 423 | 0 | 423 | 384 |
| Sub-total: Heavy Equipment | 30 | 3 | 0 | 0 | 0 | 0 | 0 | 423 | 0 | 423 | 384 |
| Commuting Vehicles - Fugitive Dust | 7 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 0 | 34 | 31 |
| Sub-total: Commuting Vehicles | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 34 | 0 | 34 | 31 |
| Total | 37 | 4 | 1 | 0 | 0 | 0 | 0 | 456 | 0 | 456 | 414 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.75. Land Resources – Comprehensive Trails and Travel Management (Base Year – 2008)

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Road Maintenance | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 101 | 0 | 101 | 92 |
| Motorized Recreation | 7 | 6 | 5 | 1 | 472 | 191 | 19 | 2,607 | 3 | 2,668 | 2,421 |
| Total | 9 | 6 | 6 | 1 | 472 | 191 | 19 | 2,708 | 3 | 2,769 | 2,513 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.76. Land Resources – Comprehensive Trails and Travel Management (Alternative A – 2018)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Road Maintenance | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 103 | 0 | 103 | 93 |
| Motorized Recreation | 4 | 4 | 7 | 1 | 526 | 119 | 12 | 3,558 | 2 | 3,608 | 3,274 |
| Total | 7 | 4 | 7 | 1 | 526 | 119 | 12 | 3,661 | 2 | 3,710 | 3,367 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table U.77. Land Resources – Comprehensive Trails and Travel Management (Alternative A – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Road Maintenance | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 103 | 0 | 103 | 93 |
| Motorized Recreation | 3 | 3 | 8 | 1 | 522 | 88 | 9 | 3,796 | 4 | 3,876 | 3,517 |
| Total | 6 | 3 | 8 | 1 | 522 | 88 | 9 | 3,898 | 4 | 3,978 | 3,610 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.78. Land Resources – Comprehensive Trails and Travel Management (Alternative B – 2018)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Road Maintenance | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 90 | 0 | 90 | 82 |
| Motorized Recreation | 4 | 4 | 7 | 1 | 526 | 119 | 12 | 3,558 | 2 | 3,608 | 3,274 |
| Total | 6 | 4 | 7 | 1 | 526 | 119 | 12 | 3,649 | 2 | 3,698 | 3,356 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.79. Land Resources – Comprehensive Trails and Travel Management (Alternative B – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Road Maintenance | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 90 | 0 | 90 | 82 |
| Motorized Recreation | 3 | 3 | 8 | 1 | 522 | 88 | 9 | 3,796 | 4 | 3,876 | 3,517 |
| Total | 5 | 3 | 8 | 1 | 522 | 88 | 9 | 3,886 | 4 | 3,966 | 3,599 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.80. Land Resources – Comprehensive Trails and Travel Management (Alternative C – 2018)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Road Maintenance | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 127 | 0 | 127 | 115 |
| Motorized Recreation | 4 | 4 | 7 | 1 | 526 | 119 | 12 | 3,558 | 2 | 3,608 | 3,274 |
| Total | 7 | 4 | 7 | 1 | 526 | 119 | 12 | 3,685 | 2 | 3,735 | 3,389 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table U.81. Land Resources – Comprehensive Trails and Travel Management (Alternative C – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Road Maintenance | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 127 | 0 | 127 | 115 |
| Motorized Recreation | 3 | 3 | 8 | 1 | 522 | 88 | 9 | 3,796 | 4 | 3,876 | 3,517 |
| Total | 6 | 3 | 8 | 1 | 522 | 88 | 9 | 3,923 | 4 | 4,003 | 3,632 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.82. Land Resources – Comprehensive Trails and Travel Management (Alternative D – 2018)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Road Maintenance | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 103 | 0 | 103 | 93 |
| Motorized Recreation | 4 | 4 | 7 | 1 | 526 | 119 | 12 | 3,558 | 2 | 3,608 | 3,274 |
| Total | 7 | 4 | 7 | 1 | 526 | 119 | 12 | 3,661 | 2 | 3,710 | 3,367 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table U.83. Land Resources – Comprehensive Trails and Travel Management (Alternative D – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Road Maintenance | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 103 | 0 | 103 | 93 |
| Motorized Recreation | 3 | 3 | 8 | 1 | 522 | 88 | 9 | 3,796 | 4 | 3,876 | 3,517 |
| Total | 6 | 3 | 8 | 1 | 522 | 88 | 9 | 3,898 | 4 | 3,978 | 3,610 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.84. Land Resources – Livestock Grazing (Base Year – 2008)

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 60 | 0 | 60 | 54 |
| Sub-total: Construction | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 60 | 0 | 60 | 54 |
| Commuting Vehicles - Fugitive Dust | 77 | 7 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 4 | 0 | 86 | 4 | 0 | 1,756 | 0 | 1,761 | 1,598 |
| Enteric Fermentation and Manure | --- | --- | --- | --- | --- | --- | --- | | 1,187 | 24,919 | 22,613 |
| Sub-total: Operations and Maintenance | 77 | 8 | 4 | 0 | 86 | 4 | 0 | 1,756 | 1,187 | 26,680 | 24,211 |
| Total | 80 | 8 | 5 | 0 | 86 | 4 | 0 | 1,816 | 1,187 | 26,740 | 24,265 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.85. Land Resources – Livestock Grazing (Alternative A – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 0 | 62 | 56 |
| Sub-total: Construction | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 0 | 62 | 56 |
| Commuting Vehicles - Fugitive Dust | 77 | 7 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 4 | 0 | 86 | 4 | 0 | 1,756 | 0 | 1,761 | 1,598 |
| Enteric Fermentation and Manure | --- | --- | --- | --- | --- | --- | --- | | 1,187 | 24,919 | 22,613 |
| Sub-total: Operations and Maintenance | 77 | 8 | 4 | 0 | 86 | 4 | 0 | 1,756 | 1,187 | 26,680 | 24,211 |
| Total | 80 | 8 | 4 | 0 | 86 | 4 | 0 | 1,818 | 1,187 | 26,742 | 24,267 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.86. Land Resources – Livestock Grazing (Alternative A – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 3 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 0 | 62 | 56 |
| Sub-total: Construction | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 0 | 62 | 56 |
| Commuting Vehicles - Fugitive Dust | 77 | 7 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 4 | 0 | 86 | 4 | 0 | 1,756 | 0 | 1,761 | 1,598 |
| Enteric Fermentation and Manure | --- | --- | --- | --- | --- | --- | --- | | 1,187 | 24,919 | 22,613 |
| Sub-total: Operations and Maintenance | 77 | 8 | 4 | 0 | 86 | 4 | 0 | 1,756 | 1,187 | 26,680 | 24,211 |
| Total | 80 | 8 | 4 | 0 | 86 | 4 | 0 | 1,818 | 1,187 | 26,742 | 24,267 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.87. Land Resources – Livestock Grazing (Alternative B – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub-total: Construction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Commuting Vehicles - Fugitive Dust | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Enteric Fermentation and Manure | --- | --- | --- | --- | --- | --- | --- | | 0 | 0 | 0 |
| Sub-total: Operations and Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.88. Land Resources – Livestock Grazing (Alternative B – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub-total: Construction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Commuting Vehicles - Fugitive Dust | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Enteric Fermentation and Manure | --- | --- | --- | --- | --- | --- | --- | | 0 | 0 | 0 |
| Sub-total: Operations and Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.89. Land Resources – Livestock Grazing (Alternative C – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 144 | 0 | 144 | 131 |
| Sub-total: Construction | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 144 | 0 | 144 | 131 |
| Commuting Vehicles - Fugitive Dust | 78 | 8 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 4 | 0 | 87 | 4 | 0 | 1,808 | 0 | 1,813 | 1,645 |
| Enteric Fermentation and Manure | --- | --- | --- | --- | --- | --- | --- | | 1,614 | 33,894 | 30,757 |
| Sub-total: Operations and Maintenance | 78 | 8 | 4 | 0 | 87 | 4 | 0 | 1,808 | 1,614 | 35,707 | 32,402 |
| Total | 84 | 8 | 5 | 0 | 87 | 4 | 0 | 1,952 | 1,614 | 35,852 | 32,533 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

**Table U.90. Land Resources – Livestock Grazing (Alternative C – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 144 | 0 | 144 | 131 |
| Sub-total: Construction | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 144 | 0 | 144 | 131 |
| Commuting Vehicles - Fugitive Dust | 78 | 8 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 4 | 0 | 87 | 4 | 0 | 1,808 | 0 | 1,813 | 1,645 |
| Enteric Fermentation and Manure | --- | --- | --- | --- | --- | --- | --- | | 1,614 | 33,894 | 30,757 |
| Sub-total: Operations and Maintenance | 78 | 8 | 4 | 0 | 87 | 4 | 0 | 1,808 | 1,614 | 35,707 | 32,402 |
| Total | 84 | 8 | 5 | 0 | 87 | 4 | 0 | 1,952 | 1,614 | 35,852 | 32,533 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.91. Land Resources – Livestock Grazing (Alternative D – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Heavy Equipment - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 144 | 0 | 144 | 131 |
| Sub-total: Construction | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 144 | 0 | 144 | 131 |
| Commuting Vehicles - Fugitive Dust | 78 | 8 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 4 | 0 | 87 | 4 | 0 | 1,808 | 0 | 1,813 | 1,645 |
| Enteric Fermentation and Manure | --- | --- | --- | --- | --- | --- | --- | | 1,614 | 33,894 | 30,757 |
| Sub-total: Operations and Maintenance | 78 | 8 | 4 | 0 | 87 | 4 | 0 | 1,808 | 1,614 | 35,707 | 32,402 |
| Total | 84 | 8 | 5 | 0 | 87 | 4 | 0 | 1,952 | 1,614 | 35,852 | 32,533 |

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table U.92. Land Resources – Livestock Grazing (Alternative D – 2027)**

| | Annual Emissions (Tons) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Heavy Equipment - Fugitive Dust | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment - Vehicle Exhaust | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 144 | 0 | 144 | 131 |
| Sub-total: Construction | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 144 | 0 | 144 | 131 |
| Commuting Vehicles - Fugitive Dust | 78 | 8 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Commuting Vehicles - Vehicle Exhaust | 0 | 0 | 4 | 0 | 87 | 4 | 0 | 1,808 | 0 | 1,813 | 1,645 |
| Enteric Fermentation and Manure | --- | --- | --- | --- | --- | --- | --- | | 1,614 | 33,894 | 30,757 |
| Sub-total: Operations and Maintenance | 78 | 8 | 4 | 0 | 87 | 4 | 0 | 1,808 | 1,614 | 35,707 | 32,402 |
| Total | 84 | 8 | 5 | 0 | 87 | 4 | 0 | 1,952 | 1,614 | 35,852 | 32,533 |
| a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1 | | | | | | | | | | | |

## Table U.93. Leasable Minerals – Conventional Oil and Gas Development – Total (BLM and Non-BLM) Wells (Base Year – 2008)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 32 | 3 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment Combustive Emissions a | 8 | 7 | 136 | 3 | 37 | 10 | 1 | 15,705 | 0 | 0 | 15,757 | 14,254 |
| Well Completion Flaring | 0 | 0 | 2 | 0 | 11 | 63 | 6 | 2 | 0 | 0 | 2 | 2 |
| Commuting Vehicles - Construction | 30 | 3 | 1 | 0 | 1 | 0 | 0 | 315 | 0 | | 315 | 286 |
| Wind Erosion | 6 | 1 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 77 | 15 | 139 | 3 | 50 | 73 | 7 | 16,022 | 0 | 0 | 16,074 | 14,542 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 26 | 26 | 766 | 2 | 383 | 383 | 115 | 305,692 | 639 | 3 | 319,968 | 290,821 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 428 | 0 | 0 | 428 | 388 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 600 | 225 | 6,516 | 397 | | 14,860 | 14,257 |
| Station Visits - Operations | 58 | 6 | 1 | 0 | 3 | 1 | 0 | 201 | 0 | | 201 | 182 |
| Well Workover - Operations | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 317 | 0 | 0 | 318 | 287 |
| Well & Pipeline visits for Inspection & Repair - Operations | 71 | 7 | 1 | 0 | 2 | 1 | 0 | 123 | 0 | | 123 | 111 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 700 | 70 | 49 | 117 | | 2,498 | 2,493 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 1,070 | 107 | 630 | 9,808 | | 206,595 | 206,537 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 785 | 79 | 463 | 7,203 | | 151,728 | 151,686 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 156 | 40 | 770 | 2 | 389 | 3,540 | 596 | 314,418 | 18,164 | 3 | 696,719 | 666,762 |
| | | | | | | | | | | | | |
| Road Maintenance | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 149 | 0 | | 149 | 135 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 149 | 0 | 0 | 149 | 135 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | | 3 | 3 |
| Well Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 93 | 0 | | 93 | 85 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Sub-total: Reclamation | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 96 | 0 | 0 | 96 | 87 |
| | | | | | | | | | | | | |
| Total Emissions | 240 | 55 | 910 | 5 | 439 | 3,614 | 603 | 330,685 | 18,164 | 3 | 713,038 | 681,527 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately | | | | | | | | | | | | |

## Table U.94. Leasable Minerals – Conventional Oil and Gas Development – Total Wells (Alternative A – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 80 | 8 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 32 | 31 | 564 | 13 | 153 | 42 | 4 | 65,312 | 1 | 1 | 65,531 | 59,281 |
| Well Completion Flaring | 1 | 1 | 9 | 0 | 47 | 264 | 26 | 9 | 0 | 0 | 9 | 8 |
| Commuting Vehicles - Construction | 119 | 12 | 4 | 0 | 5 | 2 | 0 | 1,199 | 0 | | 1,200 | 1,089 |
| Wind Erosion | 27 | 4 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 259 | 56 | 577 | 13 | 205 | 308 | 31 | 66,521 | 1 | 1 | 66,740 | 60,378 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 55 | 55 | 1,604 | 3 | 802 | 802 | 241 | 640,389 | 1,339 | 6 | 670,295 | 609,234 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 896 | 0 | 0 | 898 | 813 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 1,257 | 471 | 13,651 | 832 | | 31,130 | 29,866 |
| Station Visits - Operations | 122 | 12 | 2 | 0 | 6 | 3 | 0 | 421 | 0 | | 421 | 382 |
| Well Workover - Operations | 2 | 1 | 9 | 0 | 3 | 1 | 0 | 1,330 | 0 | 0 | 1,334 | 1,207 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 149 | 15 | 1 | 0 | 4 | 2 | 0 | 257 | 0 | | 257 | 233 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 1,466 | 147 | 102 | 244 | | 5,233 | 5,223 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 2,241 | 224 | 1,320 | 20,546 | | 432,792 | 432,670 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 1,646 | 165 | 969 | 15,090 | | 317,853 | 317,763 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 328 | 83 | 1,618 | 4 | 816 | 7,416 | 1,248 | 659,335 | 38,052 | 6 | 1,460,212 | 1,397,393 |
| | | | | | | | | | | | | |
| Road Maintenance | 9 | 1 | 1 | 0 | 1 | 0 | 0 | 312 | 0 | | 312 | 283 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 9 | 1 | 1 | 0 | 1 | 0 | 0 | 312 | 0 | 0 | 312 | 283 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | | 7 | 6 |
| Well Reclamation | 7 | 1 | 1 | 0 | 1 | 0 | 0 | 195 | 0 | | 195 | 177 |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 7 | 1 | 1 | 0 | 1 | 0 | 0 | 202 | 0 | 0 | 202 | 183 |
| | | | | | | | | | | | | |
| Total Emissions | 604 | 141 | 2,196 | 17 | 1,022 | 7,725 | 1,279 | 726,368 | 38,052 | 6 | 1,527,466 | 1,458,236 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

## Table U.95. Leasable Minerals – Conventional Oil and Gas Development – Total Wells (Alternative A – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 80 | 8 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment Combustive Emissions a | 32 | 31 | 564 | 13 | 153 | 42 | 4 | 65,312 | 1 | 1 | 65,531 | 59,281 |
| Well Completion Flaring | 1 | 1 | 9 | 0 | 47 | 264 | 26 | 9 | 0 | 0 | 9 | 8 |
| Commuting Vehicles - Construction | 119 | 12 | 4 | 0 | 5 | 2 | 0 | 1,199 | 0 | | 1,200 | 1,089 |
| Wind Erosion | 27 | 4 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 259 | 56 | 577 | 13 | 205 | 308 | 31 | 66,521 | 1 | 1 | 66,740 | 60,378 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 43 | 43 | 1,251 | 3 | 626 | 626 | 188 | 499,550 | 1,045 | 4 | 522,878 | 475,246 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 699 | 0 | 0 | 700 | 634 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 980 | 368 | 10,649 | 649 | | 24,284 | 23,298 |
| Station Visits - Operations | 95 | 10 | 2 | 0 | 5 | 2 | 0 | 329 | 0 | | 329 | 298 |
| Well Workover - Operations | 2 | 0 | 9 | 0 | 3 | 1 | 0 | 1,330 | 0 | 0 | 1,334 | 1,207 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 116 | 12 | 1 | 0 | 3 | 1 | 0 | 201 | 0 | | 201 | 182 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 1,144 | 114 | 79 | 191 | | 4,082 | 4,074 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 1,748 | 175 | 1,029 | 16,028 | | 337,609 | 337,513 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 1,284 | 128 | 756 | 11,771 | | 247,948 | 247,878 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 257 | 65 | 1,264 | 3 | 637 | 5,785 | 973 | 514,621 | 29,683 | 5 | 1,139,364 | 1,090,332 |
| | | | | | | | | | | | | |
| Road Maintenance | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 243 | 0 | | 243 | 221 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 243 | 0 | 0 | 243 | 221 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | | 5 | 5 |
| Well Reclamation | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 151 | 0 | | 151 | 137 |

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 156 | 0 | 0 | 156 | 142 |
| | | | | | | | | | | | | |
| Total Emissions | 528 | 122 | 1,841 | 16 | 843 | 6,094 | 1,004 | 581,540 | 29,684 | 5 | 1,206,503 | 1,151,072 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

## Table U.96. Leasable Minerals – Conventional Oil and Gas Development – Total Wells (Alternative B – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 73 | 7 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 27 | 26 | 483 | 11 | 132 | 36 | 4 | 56,027 | 1 | 1 | 56,215 | 50,853 |
| Well Completion Flaring | 1 | 1 | 7 | 0 | 40 | 227 | 23 | 8 | 0 | 0 | 8 | 7 |
| Commuting Vehicles - Construction | 103 | 11 | 4 | 0 | 4 | 1 | 0 | 1,036 | 0 | | 1,037 | 941 |
| Wind erosion | 23 | 4 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 227 | 48 | 495 | 11 | 176 | 264 | 26 | 57,072 | 1 | 1 | 57,260 | 51,802 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 51 | 51 | 1,483 | 3 | 741 | 741 | 222 | 591,959 | 1,238 | 5 | 619,603 | 563,160 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 828 | 0 | 0 | 830 | 752 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 1,162 | 436 | 12,619 | 769 | | 28,776 | 27,608 |
| Station Visits - Operations | 113 | 11 | 2 | 0 | 6 | 3 | 0 | 389 | 0 | | 389 | 353 |
| Well Workover - Operations | 2 | 1 | 8 | 0 | 2 | 1 | 0 | 1,140 | 0 | 0 | 1,144 | 1,034 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 138 | 14 | 1 | 0 | 4 | 2 | 0 | 238 | 0 | | 238 | 216 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 1,355 | 136 | 94 | 226 | | 4,837 | 4,828 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 2,071 | 207 | 1,220 | 18,992 | | 400,061 | 399,948 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 1,521 | 152 | 896 | 13,949 | | 293,815 | 293,732 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 303 | 77 | 1,495 | 3 | 754 | 6,855 | 1,153 | 609,382 | 35,174 | 5 | 1,349,692 | 1,291,631 |
| | | | | | | | | | | | | |
| Road Maintenance | 8 | 1 | 1 | 0 | 0 | 0 | 0 | 288 | 0 | | 288 | 261 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 8 | 1 | 1 | 0 | 0 | 0 | 0 | 288 | 0 | 0 | 288 | 261 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | | 6 | 5 |
| Well Reclamation | 6 | 1 | 1 | 0 | 1 | 0 | 0 | 180 | 0 | | 181 | 164 |

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 7 | 1 | 1 | 0 | 1 | 0 | 0 | 186 | 0 | 0 | 187 | 169 |
| | | | | | | | | | | | | |
| Total Emissions | 545 | 127 | 1,991 | 14 | 931 | 7,120 | 1,180 | 666,928 | 35,175 | 6 | 1,407,426 | 1,343,864 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

## Table U.97. Leasable Minerals – Conventional Oil and Gas Development – Total Wells (Alternative B – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 73 | 7 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment Combustive Emissions a | 27 | 26 | 483 | 11 | 132 | 36 | 4 | 56,027 | 1 | 1 | 56,215 | 50,853 |
| Well Completion Flaring | 1 | 1 | 7 | 0 | 40 | 227 | 23 | 8 | 0 | 0 | 8 | 7 |
| Commuting Vehicles - Construction | 103 | 11 | 4 | 0 | 4 | 1 | 0 | 1,036 | 0 | | 1,037 | 941 |
| Wind Erosion | 23 | 4 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 227 | 48 | 495 | 11 | 176 | 264 | 26 | 57,072 | 1 | 1 | 57,260 | 51,802 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 40 | 40 | 1,158 | 2 | 579 | 579 | 174 | 462,181 | 966 | 4 | 483,765 | 439,696 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 646 | 0 | 0 | 648 | 587 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 907 | 340 | 9,852 | 601 | | 22,467 | 21,555 |
| Station Visits - Operations | 88 | 9 | 2 | 0 | 5 | 2 | 0 | 304 | 0 | | 304 | 276 |
| Well Workover - Operations | 2 | 0 | 8 | 0 | 2 | 1 | 0 | 1,140 | 0 | 0 | 1,144 | 1,034 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 107 | 11 | 1 | 0 | 3 | 1 | 0 | 186 | 0 | | 186 | 168 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 1,058 | 106 | 73 | 176 | | 3,776 | 3,770 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 1,617 | 162 | 952 | 14,829 | | 312,354 | 312,266 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 1,188 | 119 | 699 | 10,891 | | 229,401 | 229,336 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 237 | 60 | 1,169 | 3 | 589 | 5,353 | 900 | 476,034 | 27,463 | 4 | 1,054,044 | 1,008,688 |
| | | | | | | | | | | | | |
| Road Maintenance | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 225 | 0 | | 225 | 204 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 225 | 0 | 0 | 225 | 204 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | | 5 | 4 |
| Well Reclamation | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 140 | 0 | | 140 | 127 |

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 144 | 0 | 0 | 144 | 131 |
| | | | | | | | | | | | | |
| Total Emissions | 475 | 109 | 1,664 | 14 | 766 | 5,617 | 927 | 533,475 | 27,463 | 5 | 1,111,673 | 1,060,825 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

## Table U.98. Leasable Minerals – Conventional Oil and Gas Development – Total Wells (Alternative C – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 80 | 8 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 32 | 31 | 564 | 13 | 153 | 42 | 4 | 65,312 | 1 | 1 | 65,531 | 59,281 |
| Well Completion Flaring | 1 | 1 | 9 | 0 | 47 | 264 | 26 | 9 | 0 | 0 | 9 | 8 |
| Commuting Vehicles - Construction | 119 | 12 | 4 | 0 | 5 | 2 | 0 | 1,199 | 0 | | 1,200 | 1,089 |
| Wind Erosion | 27 | 4 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 259 | 56 | 577 | 13 | 205 | 308 | 31 | 66,521 | 1 | 1 | 66,740 | 60,378 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 55 | 55 | 1,606 | 3 | 803 | 803 | 241 | 641,199 | 1,341 | 6 | 671,142 | 610,004 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 897 | 0 | 0 | 899 | 814 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 1,258 | 472 | 13,669 | 833 | | 31,169 | 29,904 |
| Station Visits - Operations | 122 | 12 | 2 | 0 | 6 | 3 | 0 | 422 | 0 | | 422 | 383 |
| Well Workover - Operations | 2 | 1 | 9 | 0 | 3 | 1 | 0 | 1,330 | 0 | 0 | 1,334 | 1,207 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 149 | 15 | 1 | 0 | 4 | 2 | 0 | 257 | 0 | | 257 | 234 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 1,468 | 147 | 102 | 245 | | 5,239 | 5,230 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 2,243 | 224 | 1,321 | 20,572 | | 433,339 | 433,217 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 1,648 | 165 | 970 | 15,109 | | 318,255 | 318,165 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 329 | 83 | 1,620 | 4 | 817 | 7,426 | 1,249 | 660,166 | 38,100 | 6 | 1,462,056 | 1,399,157 |
| | | | | | | | | | | | | |
| Road Maintenance | 9 | 1 | 1 | 0 | 1 | 0 | 0 | 312 | 0 | | 312 | 283 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 9 | 1 | 1 | 0 | 1 | 0 | 0 | 312 | 0 | 0 | 312 | 283 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | | 7 | 6 |
| Well Reclamation | 7 | 1 | 1 | 0 | 1 | 0 | 0 | 195 | 0 | | 196 | 177 |

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 7 | 1 | 1 | 0 | 1 | 0 | 0 | 202 | 0 | 0 | 202 | 183 |
| | | | | | | | | | | | | |
| Total Emissions | 604 | 141 | 2,199 | 17 | 1,023 | 7,734 | 1,280 | 727,201 | 38,100 | 6 | 1,529,311 | 1,460,002 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

## Table U.99. Leasable Minerals – Conventional Oil and Gas Development – Total Wells (Alternative C – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 80 | 8 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment Combustive Emissions a | 32 | 31 | 564 | 13 | 153 | 42 | 4 | 65,312 | 1 | 1 | 65,531 | 59,281 |
| Well Completion Flaring | 1 | 1 | 9 | 0 | 47 | 264 | 26 | 9 | 0 | 0 | 9 | 8 |
| Commuting Vehicles - Construction | 119 | 12 | 4 | 0 | 5 | 2 | 0 | 1,199 | 0 | | 1,200 | 1,089 |
| Wind Erosion | 27 | 4 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 259 | 56 | 577 | 13 | 205 | 308 | 31 | 66,521 | 1 | 1 | 66,740 | 60,378 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 43 | 43 | 1,254 | 3 | 627 | 627 | 188 | 500,359 | 1,046 | 5 | 523,725 | 476,017 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 700 | 0 | 0 | 701 | 635 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 982 | 368 | 10,666 | 650 | | 24,323 | 23,336 |
| Station Visits - Operations | 95 | 10 | 2 | 0 | 5 | 2 | 0 | 329 | 0 | | 329 | 299 |
| Well Workover - Operations | 2 | 0 | 9 | 0 | 3 | 1 | 0 | 1,330 | 0 | 0 | 1,334 | 1,207 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 116 | 12 | 1 | 0 | 3 | 1 | 0 | 201 | 0 | | 201 | 182 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 1,145 | 115 | 80 | 191 | | 4,088 | 4,081 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 1,751 | 175 | 1,031 | 16,054 | | 338,156 | 338,060 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 1,286 | 129 | 757 | 11,790 | | 248,350 | 248,280 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 257 | 65 | 1,266 | 3 | 638 | 5,795 | 975 | 515,452 | 29,731 | 5 | 1,141,208 | 1,092,096 |
| | | | | | | | | | | | | |
| Road Maintenance | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 243 | 0 | | 243 | 221 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 243 | 0 | 0 | 243 | 221 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | | 5 | 5 |
| Well Reclamation | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 151 | 0 | | 151 | 137 |

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 156 | 0 | 0 | 156 | 142 |
| | | | | | | | | | | | | |
| Total Emissions | 529 | 122 | 1,843 | 16 | 844 | 6,103 | 1,006 | 582,373 | 29,732 | 5 | 1,208,348 | 1,152,837 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

## Table U.100. Leasable Minerals – Conventional Oil and Gas Development – Total Wells (Alternative D – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 79 | 8 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 31 | 30 | 546 | 12 | 148 | 41 | 4 | 63,249 | 1 | 1 | 63,461 | 57,408 |
| Well Completion Flaring | 1 | 1 | 8 | 0 | 46 | 256 | 26 | 9 | 0 | 0 | 9 | 8 |
| Commuting Vehicles - Construction | 115 | 12 | 4 | 0 | 5 | 2 | 0 | 1,163 | 0 | | 1,164 | 1,056 |
| Wind Erosion | 26 | 4 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 252 | 54 | 559 | 12 | 199 | 298 | 30 | 64,421 | 1 | 1 | 64,634 | 58,472 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 54 | 54 | 1,579 | 3 | 789 | 789 | 237 | 630,271 | 1,318 | 6 | 659,705 | 599,609 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 882 | 0 | 0 | 883 | 800 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 1,237 | 464 | 13,436 | 819 | | 30,638 | 29,394 |
| Station Visits - Operations | 120 | 12 | 2 | 0 | 6 | 3 | 0 | 414 | 0 | | 415 | 376 |
| Well Workover - Operations | 2 | 1 | 9 | 0 | 3 | 1 | 0 | 1,287 | 0 | 0 | 1,292 | 1,168 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 146 | 15 | 1 | 0 | 4 | 2 | 0 | 253 | 0 | | 253 | 230 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 1,443 | 144 | 100 | 240 | | 5,150 | 5,141 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 2,205 | 221 | 1,299 | 20,222 | | 425,954 | 425,834 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 1,620 | 162 | 954 | 14,851 | | 312,831 | 312,743 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 323 | 82 | 1,592 | 4 | 803 | 7,299 | 1,228 | 648,896 | 37,450 | 6 | 1,437,121 | 1,375,295 |
| | | | | | | | | | | | | |
| Road Maintenance | 9 | 1 | 1 | 0 | 0 | 0 | 0 | 307 | 0 | | 307 | 278 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 9 | 1 | 1 | 0 | 0 | 0 | 0 | 307 | 0 | 0 | 307 | 278 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | | 6 | 6 |
| Well Reclamation | 7 | 1 | 1 | 0 | 1 | 0 | 0 | 192 | 0 | | 192 | 174 |

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 7 | 1 | 1 | 0 | 1 | 0 | 0 | 199 | 0 | 0 | 199 | 180 |
| | | | | | | | | | | | | |
| Total Emissions | 591 | 138 | 2,153 | 16 | 1,003 | 7,598 | 1,258 | 713,822 | 37,451 | 6 | 1,502,260 | 1,434,226 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

## Table U.101. Leasable Minerals – Conventional Oil and Gas Development – Total Wells (Alternative D – 2027)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 79 | 8 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| Heavy Equipment Combustive Emissions a | 31 | 30 | 546 | 12 | 148 | 41 | 4 | 63,249 | 1 | 1 | 63,461 | 57,408 |
| Well Completion Flaring | 1 | 1 | 8 | 0 | 46 | 256 | 26 | 9 | 0 | 0 | 9 | 8 |
| Commuting Vehicles - Construction | 115 | 12 | 4 | 0 | 5 | 2 | 0 | 1,163 | 0 | | 1,164 | 1,056 |
| Wind Erosion | 26 | 4 | --- | --- | --- | --- | --- | --- | --- | | --- | --- |
| | | | | | | | | | | | | |
| Sub-total: Construction | 252 | 54 | 559 | 12 | 199 | 298 | 30 | 64,421 | 1 | 1 | 64,634 | 58,472 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 42 | 42 | 1,232 | 3 | 616 | 616 | 185 | 491,860 | 1,028 | 4 | 514,829 | 467,931 |
| Separator, Dehydrator & Water Tank Heaters - Operations a | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 688 | 0 | 0 | 689 | 625 |
| Dehy Venting and Flashing | --- | --- | --- | --- | --- | 965 | 362 | 10,485 | 639 | | 23,910 | 22,939 |
| Station Visits - Operations | 94 | 9 | 2 | 0 | 5 | 2 | 0 | 323 | 0 | | 323 | 294 |
| Well Workover - Operations | 2 | 0 | 9 | 0 | 3 | 1 | 0 | 1,287 | 0 | 0 | 1,292 | 1,168 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 114 | 11 | 1 | 0 | 3 | 1 | 0 | 197 | 0 | | 198 | 179 |
| Tanks Condensate and Loadout | --- | --- | --- | --- | --- | 1,126 | 113 | 78 | 188 | | 4,019 | 4,012 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 1,721 | 172 | 1,014 | 15,781 | | 332,412 | 332,318 |
| Pneumatic Devices | --- | --- | --- | --- | --- | 1,264 | 126 | 744 | 11,590 | | 244,131 | 244,063 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 253 | 64 | 1,244 | 3 | 627 | 5,696 | 958 | 506,677 | 29,226 | 4 | 1,121,804 | 1,073,529 |
| | | | | | | | | | | | | |
| Road Maintenance | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 239 | 0 | | 239 | 217 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 239 | 0 | 0 | 239 | 217 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | | 5 | 5 |
| Well Reclamation | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 149 | 0 | | 149 | 135 |

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 154 | 0 | 0 | 154 | 139 |
| | | | | | | | | | | | | |
| Total Emissions | 517 | 119 | 1,803 | 15 | 826 | 5,995 | 988 | 571,491 | 29,227 | 5 | 1,186,830 | 1,132,357 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

## Table U.102. Leasable Minerals – CBNG Development – Total (BLM and Non-BLM) Wells (Base Year – 2008)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 1 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 0 | 0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 129 | 0 | 0 | 129 | 117 |
| Commuting Vehicles - Construction | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | | 9 | 8 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 137 | 0 | 0 | | 125 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 0 | 0 | 14 | 0 | 7 | 7 | 2 | 5,396 | 11 | 0 | 5,648 | 5,125 |
| Dehydrators | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 132 | 0 | 0 | 132 | 120 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 0 | 0 | 2 | 65 | | 1,365 | 1,239 |
| Pneumatics | --- | --- | --- | --- | --- | 3 | 0 | 32 | 507 | | 10,677 | 9,689 |
| Station Visits - Operations | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | | 10 | 9 |
| Well Workover - Operations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 8 | 8 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 7 | 1 | 15 | 0 | 8 | 10 | 3 | 6,573 | 583 | 0 | 18,835 | 17,091 |
| | | | | | | | | | | | | |
| Road Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | | 2 | 2 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Well Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 9 | 1 | 16 | 0 | 8 | 10 | 3 | 6,713 | 583 | 0 | 18,838 | 17,219 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.103. Leasable Minerals – CBNG Development – Total Wells (Alternative A – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 17 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 8 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions | 2 | 2 | 35 | 1 | 12 | 3 | 0 | 4,646 | 0 | 0 | 4,660 | 4,229 |
| Commuting Vehicles - Construction | 18 | 2 | 1 | 0 | 1 | 0 | 0 | 255 | 0 | | 255 | 231 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 45 | 7 | 36 | 1 | 13 | 3 | 0 | 4,900 | 0 | 0 | 4,915 | 4,460 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations | 14 | 14 | 397 | 1 | 199 | 199 | 60 | 158,609 | 332 | 1 | 166,019 | 150,653 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 15 | 8 | 1,453 | 0 | 0 | 1,456 | 1,321 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 5 | 1 | 71 | 1,907 | | 40,124 | 36,410 |
| Pneumatics | --- | --- | --- | --- | --- | 74 | 7 | 953 | 14,899 | | 313,824 | 284,777 |
| Station Visits - Operations | 20 | 2 | 0 | 0 | 1 | 0 | 0 | 69 | 0 | | 69 | 63 |
| Well Workover - Operations | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 347 | 0 | 0 | 348 | 316 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 21 | 2 | 0 | 0 | 1 | 0 | 0 | 37 | 0 | | 37 | 34 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 56 | 18 | 402 | 1 | 203 | 294 | 75 | 162,530 | 17,138 | 1 | 522,870 | 474,473 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 54 | 0 | | 54 | 49 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 54 | 0 | 0 | 54 | 49 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 0 | | 33 | 30 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 34 | 31 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 103 | 25 | 438 | 2 | 216 | 297 | 75 | 167,518 | 17,138 | 1 | 527,873 | 479,013 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.104. Leasable Minerals – CBNG Development – Total Wells (Alternative A – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 17 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 8 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 2 | 2 | 35 | 1 | 12 | 3 | 0 | 4,646 | 0 | 0 | 4,660 | 4,229 |
| Commuting Vehicles - Construction | 18 | 2 | 1 | 0 | 1 | 0 | 0 | 255 | 0 | | 255 | 231 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 45 | 7 | 36 | 1 | 13 | 3 | 0 | 4,900 | 0 | 0 | 4,915 | 4,460 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 12 | 12 | 358 | 1 | 179 | 179 | 54 | 142,806 | 299 | 1 | 149,478 | 135,642 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 14 | 7 | 1,321 | 0 | 0 | 1,323 | 1,201 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 5 | 0 | 64 | 1,717 | | 36,126 | 32,782 |
| Pneumatics | --- | --- | --- | --- | --- | 67 | 7 | 858 | 13,414 | | 282,556 | 256,403 |
| Station Visits - Operations | 18 | 2 | 0 | 0 | 0 | 0 | 0 | 31 | 0 | | 31 | 28 |
| Well Workover - Operations | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 347 | 0 | 0 | 348 | 316 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 19 | 2 | 0 | 0 | 1 | 0 | 0 | 33 | 0 | | 33 | 30 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 50 | 16 | 362 | 1 | 182 | 265 | 68 | 146,451 | 15,430 | 1 | 470,889 | 427,304 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 48 | 0 | | 48 | 44 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 48 | 0 | 0 | 48 | 44 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | | 30 | 27 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 31 | 28 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 97 | 23 | 398 | 2 | 195 | 268 | 68 | 151,431 | 15,430 | 1 | 475,883 | 431,836 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.105. Leasable Minerals – CBNG Development – Total Wells (Alternative B – 2018)

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Well Pad & Station Construction - Fugitive Dust | 9 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 4 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions | 1 | 1 | 19 | 0 | 6 | 1 | 0 | 2,491 | 0 | 0 | 2,499 | 2,268 |
| Commuting Vehicles - Construction | 10 | 1 | 1 | 0 | 1 | 0 | 0 | 136 | 0 | | 137 | 124 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 24 | 4 | 19 | 0 | 7 | 2 | 0 | 2,628 | 0 | 0 | 2,635 | 2,392 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations | 7 | 7 | 211 | 0 | 105 | 105 | 32 | 84,026 | 176 | 1 | 87,952 | 79,811 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 8 | 4 | 792 | 0 | 0 | 794 | 720 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 3 | 0 | 38 | 1,010 | | 21,256 | 19,289 |
| Pneumatics | --- | --- | --- | --- | --- | 39 | 4 | 505 | 7,893 | | 166,254 | 150,866 |
| Station Visits - Operations | 11 | 1 | 0 | 0 | 1 | 0 | 0 | 36 | 0 | | 36 | 33 |
| Well Workover - Operations | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 186 | 0 | 0 | 187 | 169 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | | 20 | 18 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 29 | 9 | 214 | 0 | 108 | 156 | 40 | 86,594 | 9,079 | 1 | 277,492 | 251,807 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 0 | | 29 | 26 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 29 | 26 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | | 17 | 16 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 18 | 16 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 55 | 13 | 233 | 1 | 115 | 158 | 40 | 89,268 | 9,079 | 1 | 280,174 | 254,241 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.106. Leasable Minerals – CBNG Development – Total Wells (Alternative B – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 9 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 4 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 1 | 1 | 19 | 0 | 6 | 1 | 0 | 2,491 | 0 | 0 | 2,499 | 2,268 |
| Commuting Vehicles - Construction | 10 | 1 | 1 | 0 | 1 | 0 | 0 | 136 | 0 | | 137 | 124 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 24 | 4 | 19 | 0 | 7 | 2 | 0 | 2,628 | 0 | 0 | 2,635 | 2,392 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 6 | 6 | 189 | 0 | 95 | 95 | 28 | 75,547 | 158 | 1 | 79,076 | 71,757 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 7 | 4 | 792 | 0 | 0 | 794 | 720 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 3 | 0 | 34 | 908 | | 19,111 | 17,342 |
| Pneumatics | --- | --- | --- | --- | --- | 35 | 4 | 454 | 7,096 | | 149,477 | 135,641 |
| Station Visits - Operations | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | | 17 | 15 |
| Well Workover - Operations | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 186 | 0 | 0 | 187 | 169 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | | 18 | 16 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 27 | 9 | 192 | 0 | 97 | 140 | 36 | 78,038 | 8,163 | 1 | 249,671 | 226,562 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | | 26 | 23 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 26 | 23 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 0 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | | 16 | 14 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 16 | 15 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 52 | 12 | 211 | 1 | 104 | 142 | 36 | 80,707 | 8,163 | 1 | 252,348 | 228,991 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.107. Leasable Minerals – CBNG Development – Total Wells (Alternative C – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 13 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 8 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions | 2 | 2 | 34 | 1 | 12 | 3 | 0 | 4,596 | 0 | 0 | 4,610 | 4,183 |
| Commuting Vehicles - Construction | 17 | 2 | 1 | 0 | 1 | 0 | 0 | 247 | 0 | | 247 | 225 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 41 | 7 | 35 | 1 | 13 | 3 | 0 | 4,843 | 0 | 0 | 4,858 | 4,408 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations | 8 | 8 | 234 | 0 | 117 | 117 | 35 | 93,277 | 195 | 1 | 97,635 | 88,598 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 9 | 4 | 924 | 0 | 0 | 926 | 841 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 3 | 0 | 42 | 1,122 | | 23,596 | 21,412 |
| Pneumatics | --- | --- | --- | --- | --- | 43 | 4 | 561 | 8,762 | | 184,558 | 167,475 |
| Station Visits - Operations | 12 | 1 | 0 | 0 | 1 | 0 | 0 | 43 | 0 | | 43 | 39 |
| Well Workover - Operations | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 347 | 0 | 0 | 348 | 316 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 13 | 1 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | | 22 | 20 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 34 | 11 | 238 | 1 | 120 | 173 | 44 | 96,206 | 10,079 | 1 | 308,120 | 279,601 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | | 32 | 29 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 32 | 29 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | | 19 | 18 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 20 | 18 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 76 | 17 | 274 | 1 | 133 | 176 | 45 | 101,100 | 10,079 | 1 | 313,030 | 284,056 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.108. Leasable Minerals – CBNG Development – Total Wells (Alternative C – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 13 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 8 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 2 | 2 | 34 | 1 | 12 | 3 | 0 | 4,596 | 0 | 0 | 4,610 | 4,183 |
| Commuting Vehicles - Construction | 17 | 2 | 1 | 0 | 1 | 0 | 0 | 247 | 0 | | 247 | 225 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 41 | 7 | 35 | 1 | 13 | 3 | 0 | 4,843 | 0 | 0 | 4,858 | 4,408 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 12 | 12 | 359 | 1 | 180 | 180 | 54 | 143,384 | 300 | 1 | 150,083 | 136,192 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 14 | 7 | 1,321 | 0 | 0 | 1,323 | 1,201 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 5 | 0 | 64 | 1,724 | | 36,272 | 32,915 |
| Pneumatics | --- | --- | --- | --- | --- | 67 | 7 | 862 | 13,469 | | 283,700 | 257,441 |
| Station Visits - Operations | 18 | 2 | 0 | 0 | 0 | 0 | 0 | 31 | 0 | | 31 | 28 |
| Well Workover - Operations | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 347 | 0 | 0 | 348 | 316 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 19 | 2 | 0 | 0 | 1 | 0 | 0 | 33 | 0 | | 33 | 30 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 50 | 16 | 364 | 1 | 183 | 266 | 68 | 147,033 | 15,493 | 1 | 472,784 | 429,024 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 49 | 0 | | 49 | 44 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 49 | 44 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | | 30 | 27 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 31 | 28 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 94 | 23 | 399 | 2 | 196 | 269 | 68 | 151,955 | 15,493 | 1 | 477,721 | 433,504 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

## Table U.109. Leasable Minerals – CBNG Development – Total Wells (Alternative D – 2018)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 12 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 7 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions | 2 | 2 | 32 | 1 | 11 | 2 | 0 | 4,253 | 0 | 0 | 4,266 | 3,871 |
| Commuting Vehicles - Construction | 16 | 2 | 1 | 0 | 1 | 0 | 0 | 228 | 0 | | 228 | 207 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 37 | 6 | 33 | 1 | 12 | 3 | 0 | 4,481 | 0 | 0 | 4,495 | 4,079 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations | 7 | 7 | 196 | 0 | 98 | 98 | 29 | 78,245 | 164 | 1 | 81,900 | 74,320 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 7 | 4 | 792 | 0 | 0 | 794 | 720 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 3 | 0 | 35 | 941 | | 19,794 | 17,962 |
| Pneumatics | --- | --- | --- | --- | --- | 36 | 4 | 470 | 7,350 | | 154,815 | 140,485 |
| Station Visits - Operations | 11 | 1 | 0 | 0 | 1 | 0 | 0 | 36 | 0 | | 36 | 33 |
| Well Workover - Operations | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 321 | 0 | 0 | 323 | 293 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | | 18 | 17 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 28 | 9 | 200 | 0 | 101 | 145 | 37 | 80,909 | 8,454 | 1 | 258,672 | 234,730 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | | 27 | 24 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 27 | 24 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | | 16 | 15 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 17 | 15 |
| | | | | | | | | | | | | |

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Total Emissions | 67 | 15 | 233 | 1 | 113 | 148 | 37 | 85,433 | 8,454 | 1 | 263,210 | 238,848 |

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

## Table U.110. Leasable Minerals – CBNG Development – Total Wells (Alternative D – 2027)

| Activity | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | $SO_2$ | CO | VOC | HAPs a | $CO_2$ | $CH_4$ | $N_2O$ | $CO_{2eq}$ | $CO_{2eq}$ metric tonnes |
| Well Pad & Station Construction - Fugitive Dust | 12 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wind Erosion | 7 | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heavy Equipment Combustive Emissions a | 2 | 2 | 32 | 1 | 11 | 2 | 0 | 4,253 | 0 | 0 | 4,266 | 3,871 |
| Commuting Vehicles - Construction | 16 | 2 | 1 | 0 | 1 | 0 | 0 | 228 | 0 | | 228 | 207 |
| | | | | | | | | | | | | |
| Sub-total: Construction | 37 | 6 | 33 | 1 | 12 | 3 | 0 | 4,481 | 0 | 0 | 4,495 | 4,079 |
| | | | | | | | | | | | | |
| Natural Gas Compression - Operations a | 11 | 11 | 325 | 1 | 163 | 163 | 49 | 129,894 | 272 | 1 | 135,962 | 123,378 |
| Dehydrators | 0 | 0 | 1 | 0 | 1 | 12 | 6 | 1,189 | 0 | 0 | 1,191 | 1,081 |
| Central Processing Heaters | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 990 | 0 | 0 | 992 | 901 |
| Wellhead Fugitives | --- | --- | --- | --- | --- | 5 | 0 | 58 | 1,562 | | 32,859 | 29,818 |
| Pneumatics | --- | --- | --- | --- | --- | 61 | 6 | 781 | 12,201 | | 257,008 | 233,220 |
| Station Visits - Operations | 16 | 2 | 0 | 0 | 0 | 0 | 0 | 28 | 0 | | 28 | 25 |
| Well Workover - Operations | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 321 | 0 | 0 | 323 | 293 |
| Well & Pipeline Visits for Inspection & Repair - Operations | 18 | 2 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | | 30 | 28 |
| | | | | | | | | | | | | |
| Sub-total: Operations | 46 | 15 | 330 | 1 | 166 | 241 | 62 | 133,292 | 14,035 | 1 | 428,394 | 388,743 |
| | | | | | | | | | | | | |
| Road Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 0 | | 44 | 40 |
| | | | | | | | | | | | | |
| Sub-total: Maintenance | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 44 | 40 |
| | | | | | | | | | | | | |
| Road Reclamation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 |
| Well Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | | 27 | 24 |
| | | | | | | | | | | | | |
| Sub-total: Reclamation | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 0 | 0 | 28 | 25 |
| | | | | | | | | | | | | |

| | Annual Emissions (Tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **$PM_{10}$** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** | **CO** | **VOC** | **HAPs a** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_{2eq}$** | **$CO_{2eq}$ metric tonnes** |
| Total Emissions | 85 | 21 | 363 | 2 | 178 | 244 | 62 | 137,845 | 14,035 | 1 | 432,961 | 392,887 |
| a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression | | | | | | | | | | | | |

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# Appendix V. Wild Horse Management in the Lander Planning Area

The Bureau of Land Management (BLM) monitors wild horse populations to comply with population management objectives set in the land use plan. The BLM has been conducting ongoing monitoring of wild horses and their habitat in Herd Management Areas (HMA) for many years.

The monitoring program, although not exclusive to the wild horse program, includes collection and monitoring of the following types of information carried out by BLM range, wildlife, and wild horse staff in the planning area:

- Precipitation data
- Rangeland trends (uplands and riparian)
- Forage utilization data
- Permitted use by livestock
- Wildlife actual use and forage requirements
- Wild horse population data, including but not limited to –
    - Population counts
    - Reproductive rates
    - Age/sex structure
    - Observation sightings
    - Determining areas of highest horse use, or concentration areas

If an evaluation of monitoring data were to indicate that wild horse management objectives in the land use plan were not being met, population adjustments in land use plans and Herd Management Area Plans (HMAPs) could be necessary. Population adjustments would be analyzed prior to initiating management actions in applicable HMAPs and Resource Management Plans (RMPs). Monitoring and adjusting the appropriate management level, as necessary, would ensure a thriving, natural ecological balance is maintained.

More information on specific management direction used in managing wild horse populations in the planning area can be found in the *Wild Horses and Burros Management Handbook (H–4700-1)*. This handbook is an assemblage of all relevant policy and technical guidance that must be considered in developing and implementing Wild Horse Management Plans (WHMPs) and actions.

**Establishment and Modification of Herd Management Areas and Appropriate Management Levels**

The current appropriate management levels were established in 1993 and 1994 from a process that included five years of focused, intensive monitoring of wild horse herd areas, use areas, and grazing allotments. Evaluation of data, public input, and environmental analysis were utilized to establish the appropriate management level for each herd. Appropriate management levels were established for the Lander Field Office by two National Environmental Policy Act analyses. In 1993, Environmental Assessment (EA) # WY-036-EA3-010 identified five HMAs: Conant Creek, Muskrat Basin, Rock Creek Mountain, Dishpan Butte, and Green Mountain. An EA developed by the Rawlins Field Office, EA# WY-037-EA4-122, identified two HMAs and appropriate management levels for Crooks Mountain and Antelope Hills.

**Appropriate Management Level/Population Expression in the Planning Area**

The existing Lander Field Office appropriate management levels are expressed as the number of adults and yearlings, including unweaned foals of the year. At the time these appropriate management levels were developed, traditional inventory periods were in late winter or very early in the year, typically in February or March.

This period included foals from the previous year that had perished or survived to approach their first birthday, and the foals of the year had not yet been born. Therefore, the number counted represented what the adult population would be for the following year, not considering subsequent mortality.

Lately, there has been a shift in inventory times to favor the months of July and August. When a herd is counted at this time, most of the foals of the year have been born and many are 2 months of age or older. Therefore, an inventory of the same herd in the same calendar year will yield a higher number, barring some unusual late-winter event resulting in unusually high mortality, than would have occurred earlier in the year.

At one time a "Minimum Viable Population" was a widely accepted term among scientists and behaviorists. The concept can best be described in terms of genetic material and its diversity rather than as a specific number of horses. Blood typing was necessary to determine the genetic characteristics of a given population. The identification of a specific population level for an area that represents a Minimum Viable Population is also influenced by the amount and frequency of interaction with other populations. It is generally agreed that 50 competent breeding animals will constitute a Minimum Viable Population under most circumstances.

Inventory practices are under review by the National Program Office. Inventory practices might be standardized, and any such standardization could include a uniform method of counting a population. Increased interest in the genetic character of a particular herd has caused some differing views on the expression of population sizes and objectives.

Geneticists usually define a population in terms of the effective population, which consists of the number of competent breeding-age animals. Therefore, colts of the year, yearlings, a portion of the 2-year olds, and the very old would not be included as part of the effective population count. The appropriate management level necessary to maintain an effective breeding population of 100 would be approximately 165 adult animals, not including unweaned foals. The exact number would vary depending on the age and sex distribution of the particular herd.

**Implications of Wild Horse Genetic Research**

Wild horses managed on public lands have a variety of histories and originate from a variety of backgrounds. Advances in genetic research have enabled the BLM to identify the specific genetic stock from which a wild horse population originates, thereby assisting in identifying the history of a population. The genetic roots of most of the horses are predominantly American, and some have beginnings as recent as the period following World War II when horses that had been used by the U.S. Army Calvary were released on public lands. Occasionally, populations have been encountered whose genetic roots can be traced to the Spanish exploration period through the identification of genotypes associated with the New World Iberian (Spanish Colonial) breeds. Populations with this distinctive genotype provide a genetic resource that the majority of wild horses on public lands do not provide. The wild horses in the Lander Field Office's Antelope Hills HMA are such a population.

In 2001, blood samples from wild horses were taken from the Cyclone Rim area in the Antelope Hills HMA and were provided to Dr. E. Gus Cothran of the Equine Parentage Testing and Research Laboratory at the University of Kentucky. Results from the genetic analysis of these samples identified a clear contribution from New World Iberian breeds. The highest average genetic association of the blood samples provided were the Spanish Colonial breeds. The next highest average genetic association was with North American Gaited breeds, most likely from the routine escape of domestic saddle stock from the surrounding areas. A report of the results of this genetic analysis is available at the Lander Field Office.

As genetic testing continues with the wild horse populations throughout the Red Desert meta-population, the necessity of maintaining the population of wild horses in the Antelope Hills HMA in genetic isolation could vary. If populations adjacent to the Antelope Hills HMA share the prevalence of New World Iberian genomes, inter-mingling these populations would be beneficial to maintain the genetic resource; therefore, isolating and maintaining an internally viable population in the Antelope Hills HMA would not be required. However, if the New World Iberian genes are prevalent only in Antelope Hills, further intermingling could cause this genetic resource to disappear. Continued monitoring and research could result in adjustments to management decisions for the Antelope Hills HMA. Adjustments would be implemented following appropriate analysis and maintenance of management documents.

**Wild Horse Management History in the State Of Wyoming and the Planning Area**

In 1971, in response to the passage of the Wild Free-Roaming Horses and Burros Act, Wyoming BLM identified the existing wild horse habitats and populations in the state that would likely be subject to the provisions of the act. These identifications were made using the best information and understanding available at the time. The result was 30 areas in the State of Wyoming with populations totaling 4,411 horses. Of those, 1,049 were estimated to be privately owned horses that would be claimed and removed from the range under the provisions of the act. Those 30 areas comprised a total of 6,557,160 acres of public lands, 389,112 acres of land owned by the State of Wyoming, and 2,479,096 acres of privately owned lands. The 30 areas varied greatly in size and land ownership.

As soon as the act passed, a number of activities that had served to limit the growth in horse numbers and the expansion of their ranges ceased. Horse populations in Wyoming began to grow.

Following passage of the act, BLM personnel began to accumulate additional information about the horses and their habitats. Area boundaries were refined as more was learned about the seasonal needs and habits of horses. By 1974, the list of 30 areas had increased to 40 areas, comprising a total of 6,820,749 acres of public lands, 406,103 acres of land owned by the State of Wyoming, and 2,355,852 acres of privately owned lands. As before, the 40 areas varied greatly in size and land ownership.

The period of 1976 to 1984 saw a great deal of activity in land use planning. For Wyoming, this can be called the Management Framework Plan Era. During this period, the 40 areas previously identified were combined into 24 areas. The Management Framework Plan process resulted in identifying 14 of those 24 areas that, in one way or another, failed to meet suitability requirements for maintaining a long-term healthy population of horses in accordance with the intent of the Act. One of the two most important criteria was that the area contained substantial amounts of private land. The other was that the horse population was too small to continue to thrive when isolated from customary sources of new genetic stock. The remaining 10 areas were then designated as HMAs. The HMAs comprised 3,322,776 public acres, 152,551 acres of land owned by the State

of Wyoming, and 861,022 acres of privately owned land. This process also identified population objectives for these herds, totaling 2,673 horses.

With respect to horses in Wyoming, this has resulted in the 16 HMAs currently recognized in the state. These 16 areas comprise 3,664,002 acres of public land, 154,737 acres of land owned by the State of Wyoming, and 846,243 acres of privately owned lands. The 16 areas still vary in size and land ownership, although not to the extent that they once did. Particularly worthy of note is the substantial amount of private land now included in designated HMAs. Much of the private acreage consists of land owned or controlled by the Rock Springs Grazing Association of southwestern Wyoming. It has made its lands available to an agreed-upon number of wild horses since 1979. Without access to those lands, approximately 1.5 million acres of adjoining and commingled public lands would be unavailable for inclusion in HMAs. This would, in effect, eliminate one-third of the free-roaming horses in Wyoming. The current, combined population objective (appropriate management level) for wild, free-roaming horses in Wyoming is 3,263, or 18 percent more than it was in 1980. Without the access to the private lands, the combined appropriate management level would be only 2,038.

If an effective breeding population of 100 horses is necessary to maintain a genetically viable herd of wild horses, 9 of the 16 HMAs in Wyoming do not have appropriate management levels that would indicate genetically stable long-term populations. However, wild horse herds in these HMAs are usually part of a larger meta-population comprising adjacent HMAs through migration and animals exchanging. The meta-population is the entire gene pool available to a specific herd.

When originally identified and reviewed through planning, HMA boundaries were designated to reflect common herd location, as well as to simplify administration and management of wild horses. As a result, several HMAs could be designated adjacent to one another in different BLM field office planning areas, or simply separated by geographic features such as watersheds. The individual populations in each HMA might be separated for most of the year, but both could share the same winter range. Sharing resources allows for regular interaction between the two populations. Interaction allows for horses from each herd to be recruited by and assimilated into the other. Therefore, although the appropriate management level of the individual HMAs would appear to be genetically deficient, each population is periodically infused with new genetic material and the genetic diversity of both herds is enhanced. In any given year, only a very few bands from each herd might actually exchange members. However, over time, the normal behaviors of each herd cause the mixing to become widespread.

From the standpoint of genetic viability, the required level of exchange of animals and the related introduction of new genetic material is not high. In small populations of less than 150 animals, the introduction of one or two competent breeding animals per generation (i.e., approximately 10 years) will ensure the maintenance of the genetic resource. Table V.1, “Wild Horse Regional Meta-populations Associated with the Planning Area” (p. 1809), identifies the wild horse HMAs in the planning area, and the meta-populations in which the horses of the HMAs interact.

**Table V.1. Wild Horse Regional Meta-populations Associated with the Planning Area**

| HMAs in the Planning Area | | Meta-population | | HMA(s) in the Meta-population | Type of Interaction | Points of Contact |
|---|---|---|---|---|---|---|
| Name | Appropriate Management Level | Name | Appropriate Management Level | | | |
| Antelope Hills[1] | 60-82 | Red Desert includes Divide Basin | 895-1324 | Stewart Creek<br>Lost Creek<br>Antelope Hills<br>Divide Basin<br>Crooks Mountain | Male migration, female exchange | Hay Reservoir<br>Bare Ring<br>Hadsell<br>Osborne Draw |
| Green Mountain[1] | 170-300 | Red Desert includes Divide Basin | 895-1324 | Stewart Creek<br>Lost Creek<br>Antelope Hills<br>Divide Basin<br>Crooks Mountain | Male migration, female exchange | Hay Reservoir<br>Bare Ring<br>Hadsell<br>Osborne Draw |
| Crooks Mountain[1] | 65-85 | Red Desert includes Divide Basin | 895-1324 | Stewart Creek<br>Lost Creek<br>Antelope Hills<br>Divide Basin<br>Green Mountain | Male migration, female exchange | Hay Reservoir<br>Bare Ring<br>Hadsell<br>Osborne Draw |
| Conant Creek[2] | 60-100 | North Lander | 320-535 | Dishpan Butte<br>Muskrat Open<br>Rock Creek Mountain | Male migration, female exchange | Beaver Rim<br>Lower Conant Creek<br>Upper Conant Creek |
| Dishpan Butte[2] | 50-100 | North Lander | 320-535 | Muskrat Open<br>Rock Creek Mountain<br>Conant Creek | Male migration, female exchange | East Fork of Long Creek<br>Beaver Rim |
| Muskrat Basin[2] | 160-250 | North Lander | 320-535 | Rock Creek Mountain<br>Conant Creek<br>Dishpan Butte | Male migration, female exchange | Beaver Rim<br>Lower Conant Creek<br>Upper Conant Creek |
| Rock Creek Mountain[2] | 50-85 | North Lander | 320-535 | Muskrat Basin<br>Conant Creek<br>Dishpan Butte | Male migration, female exchange | Beaver Rim Above and Below Conant Creek Drainage |

[1] Portions of the Antelope Hills, Crooks Mountain, Green Mountain, and Lost Creek HMA boundaries have no fences. Therefore, horses are free to migrate and exchange. Horses in the Stewart Creek and Divide Basin HMAs are fenced off from neighboring HMAs and must negotiate a fence in order to mix.

[2] Horses in the North Lander Complex Meta-population occasionally mix. These animals must negotiate fences in order to exchange with one another.

HMA Herd Management Area

The following trends have emerged in Wyoming since the passage of the Wild Free-Roaming Horses and Burros Act:

1. The average herd size has increased from 147 to 197.
2. The area of public land available for use by horses has increased slightly since 1980.
3. The area of private land occupied has decreased from 2.5 million to 846,243 acres.

4. Of the 16 herds, 14 are part of meta-populations greater than 300.

These same trends are representative of the changes that have occurred in the planning area since the passage of the act. In 1971, an estimated 435 horses subject to management under the act occupied 2,116,095 acres in 6 areas. Today, an estimated 1,540 horses subject to management under the act occupy approximately 929,000 acres in 3 areas.

It should be noted that the BLM has routinely removed excess and stray horses from the range since 1978. During that period, more than 27,000 horses have been removed from Wyoming rangelands and placed through the BLM's Adopt-a-Horse-or-Burro program. Nonetheless, the population is still in excess of 4,000 animals, an important indicator that the cornerstone principle of the act, a thriving natural ecological balance, is not imperiled by BLM management of the horses.

**Population Management Actions in the Planning Area**

Population management actions in the planning area take place as part of a state and national undertaking to allocate scarce resources, and equally scarce space, for the removal of horses from public rangelands. This is necessary so that effective planning and scheduling can occur BLM-wide. No single office controls the fiscal and logistical resources necessary to affect the desired management of horses in its jurisdiction. Instead, each office is part of the BLM-wide wild horse management program. A key part of this program is the identification of a gather cycle for a state, which can result in gathers taking place in less than ideal conditions in a particular HMA. Once established, the gather cycle needs to be followed as closely as possible.

Appropriate management levels were established to allow for a range of fluctuation in the population, while still meeting the criteria for a valid appropriate management level. In evaluating the appropriate management level, a lower limit was identified and then examined to ensure that the particular herd will remain genetically viable if periodically reduced to that level. This is a crucial consideration in many of the smaller herds in the state. Concurrently, the upper limit is evaluated to determine that, under normal climatic conditions, resource damage or other substantial conflicts would not be likely to occur if the population were allowed to increase to this level cyclically. The appropriate management level will equate to the average population level during a management cycle. Analysis of various gather cycles (occurring outside the scope of this RMP) is occurring as part of the statewide wild horse management strategy. Three- and 4-year gather cycles for the state are being evaluated and compared. Cycles longer than 4 years are also being evaluated as part of a management scheme that would employ fertility control to limit population increases.

When a gather cycle is chosen for implementation in the state, part of the evaluation leading to the choice will be the ability of the Wyoming BLM to remain in substantial conformance with the consent decree of August 28, 2003, and all other relevant law and policy. The upper and lower limits would be reevaluated and adjusted to ensure maintenance of a thriving ecological balance. Because the appropriate management levels were evaluated considering the potential for adverse effects from a 4-year gather cycle and the associated level of population fluctuation, a shorter cycle and lower average population levels would still serve the purposes of the appropriate management level determination process.

Fertility control has become a widely used tool for restraining reproduction. Currently, the most widely used method is Porcine Zona Pellucida (PZP). Most herds for which the BLM implements PZP vaccination are administered a 22-month controlled release formula in conjunction with a

gather. Some analysis indicates that this 22-month formula provides infertility at 94 percent for year one, 82 percent for year two, and 68 percent for year three. Fertility returns to normal on the fourth year. The BLM issued an instruction memorandum in March of 2009 to direct and guide the implementation of fertility control in the field. It is the policy of BLM to apply fertility control as a component of all gathers unless there is a compelling management reason not to do so. For the Lander Field Office, all HMAs have been fertility treated using the PZP-22 fertility control vaccine. The North Lander Complex was treated for the first time in July 2009. Herds in three of the five HMAs in the Red Desert Complex (three managed by Lander and two by Rawlins) were treated in 2006, 2009, and 2011.

**Inventory Practices in the Planning Area**

Inventory practices in the planning area have developed over time. At present, all inventories in the planning area are conducted using a helicopter-type aircraft. Typically, east-west transects at 1 to 1 ½ mile intervals are employed, flight height is approximately 500 feet above ground level, and airspeed is approximately 80 miles per hour. These practices have been developed to minimize stress to horses and other animals and to comply with BLM aircraft safety guidelines. Some inventories have been completed using fixed-wing aircraft, as part of a research project involving the U.S. Geological Survey Biological Resources Discipline from Fort Collins, Colorado. These inventories employ two observers, including one representing the Wyoming Department of Agriculture. This approach yields an actual, independent double count of half of the area, and a constructed double count of the other half. These results are then analyzed statistically and evaluated. Other inventories typically employ a single or double observer using a direct count method.

**Animal Health**

Animal health issues are considered at two levels: Horses removed from the range and maintained in BLM facilities, and horses remaining on the range. Both levels are afforded appropriate attention through the Memorandum of Understanding (MOU) that BLM has with the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS). This MOU provides BLM with access to a complete staff of federal veterinarians in each state. It also supplies access to a national program manager located in Fort Collins, Colorado, who can access the Veterinary Services Centers for Epidemiology and Animal Health, Veterinary Services Western Regional hub, and U.S. Department of the Interior Biological Resources Division of the U.S. Geological Survey. In addition, this ensures that APHIS will be able to incorporate the wild, free-roaming horses managed by BLM into its responsibility to ensure the health and safety of the nation's plants and animals.

At both levels, the staff of APHIS is involved with the State of Wyoming, private practitioners, and other federal agencies to ensure the appropriateness of all activities involving wild, free-roaming horses managed by BLM.

**The Wild, Free-Roaming Nature (of Wild Horses)**

There are approximately 30,000 wild horses in North America, and approximately 2,000,000 domestic horses. In the Lander RMP, the term "wild, free-roaming nature" is used to describe wild horses.

Currently, horses in all of the HMAs exhibit a wild, free-roaming nature. They are typically wary of humans, but do not display signs that would indicate an intense fear. They rely on their acute

senses, especially their sight, to enable them to maintain a feeling of safety. They use their speed and agility to quickly regain a "safe" distance when disturbed. They do not recognize or seek any dependence on humans for sustenance. One of the principle distinctions between domestic and wild horses is the ability of wild horses to make certain choices. They can choose their space, their diet, and their company. They can choose optimal behaviors for survival. In contrast, their domesticated cousins have only limited choices and depend on humans for sustenance.

The loss of a horse's wild, free-roaming nature is not a fatal disease, but it does have consequences as well as causes. The wild, free-roaming nature takes a certain kind and amount of space to sustain. What is currently available to the horses in the HMAs satisfies both kinds of space. Changes introduced to either the kind or amount of space available will cause the horses to make different choices, with the choices becoming more varied as more change occurs. Change comes in a variety of forms, most of which are either a function of, or are accompanied by, increased human presence. New roads, structures, facilities, and fences are examples. As a consequence of these increased human interactions, wild horses can lose their wild nature. Wild horses seek out the most convenient foraging areas, and therefore can become more competitive with domestic livestock. Band structure and function could cease to provide a secure environment in which young horses can mature and learn successful wild horse behavior.

# Appendix W. Travel Management Planning

## General Planning Direction

All actions associated with the management of motorized vehicle areas and trails must meet the designation criteria contained below (43 Code of Federal Regulations [CFR] 8342.1):

> The Authorized Officer shall designate all public lands as either open, limited, or closed to motorized vehicles. All designations shall be based on the protection of the resources of the public lands, the promotion of the safety of all the users of the public lands, and the minimization of conflicts among various uses of the public lands; and in accordance with the following criteria:
>
> (a) Areas and trails shall be located to minimize damage to soil, watershed, vegetation, air, or other resources of the public lands, and to prevent impairment of wilderness suitability.
>
> (b) Areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats. Special attention will be given to protect endangered or threatened species and their habitats.
>
> (c) Areas and trails shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.
>
> (d) Areas and trails shall not be located in officially designated wilderness areas or primitive areas. Areas and trails shall be located in natural areas only if the authorized officer determines that off-road vehicle use in such locations will not adversely affect their natural, esthetic, scenic, or other values for which such areas are established.

In addition, areas and trails for all types of conveyances must support the goals, objectives, and management actions contained in the Resource Management Plan (RMP), and applicable laws and policies.

## Lander Field Office Area Designations and Decisions

Travel designations in the Lander RMP include “limited” and “closed,” as described below.

Limited designations restrict travel in specified areas and/or on designated routes, roads, vehicle ways, or trails. This designation is used where travel use must be restricted to meet specific resource management objectives. Examples of limitations include number or type of conveyance; time or season of use; permitted or licensed use only; use limited to designated roads and trails; or other limitations if restrictions are necessary to meet resource management objectives, including certain competitive- or intensive-use areas that have special limitations (see 43 CFR 8340.0-5).

There are three distinct uses of the limited designation in the Lander RMP, including “designated” roads and trails, which under earlier guidance was considered a separate designation from limited. The three types of limited designations are:

- Travel limited to designated roads and trails; areas where travel is restricted to designated roads and trails.

- Travel limited to designated roads and trails and limited seasonally; in these areas travel is restricted to seasonal use periods and to designated roads trails.
- Travel limited to existing roads and trails; areas where travel is restricted to existing roads and trails. This designation is an interim designation until route-specific planning can occur. At the point at which travel planning occurs, motorized travel in the area will be limited to designated roads and trails.

Closed designations identify areas where motorized vehicle travel is prohibited. Access by means other than motorized vehicle, such as mechanized (e.g., bicycle) or nonmotorized use (e.g. pedestrian or pack), is permitted. Areas are designated closed if closure to all vehicular use is necessary to protect resources, promote visitor safety, or reduce use conflicts (see 43 CFR 8340.0-5).

**Future Implementation Planning**

The designations defined above require an additional level of effort and planning prior to implementation. A Travel Management Plan (TMP) is the document that describes the decisions related to the selection and management of the transportation network. This document can be an appendix to an RMP, incorporated in an activity implementation plan (such as a Recreation Implementation Plan), or a stand-alone document after development of the RMP. Route-specific decisions in a TMP support the RMP goals, objectives, and management actions, and the designation criteria in 43 CFR 8342.1.

A complete TMP includes:

- Criteria to select or reject specific transportation linear features in the final travel management network; to add new roads, primitive roads or trails; and to specify limitations. The criteria must include those identified in 43 CFR 8342.1.
- A map of roads, primitive roads, and trails for all travel modes and uses, including motorized, nonmotorized, and mechanized travel.
- Definitions and additional limitations for specific roads, primitive roads, and trails.
- Guidelines for managing and maintaining the travel management system. This includes, at a minimum, the development of route-specific roads, primitive roads, and trail management objectives, a sign plan, an education/public information plan, an enforcement plan, and a process requiring the application of engineering best management practices.
- Indicators to guide future plan maintenance, amendments, or revisions related to the travel management network.
- Needed easements and rights-of-way (ROWs) (to be issued to the Bureau of Land Management [BLM] or others) to maintain the existing road, primitive road, and trail network providing public land access.
- Provisions for new route construction or adaptation/relocation of existing routes.
- A plan for decommissioning and rehabilitating closed or unauthorized routes.
- A monitoring plan.
- Classification of all roads, primitive roads, and trails, designated for travel in a TMP, as assets in the Facility Asset Management System. All roads, primitive roads, and trails will also be identified as such in the Ground Transportation Linear Feature geospatial database.

**Document Purpose**

To the extent practical, TMPs should be developed concurrent with the RMP. Possible reasons for deferring the development of a TMP might be size or complexity of the area, controversy, or

incomplete data. Travel management planning can either be completed concurrently with the RMP or deferred to an implementation plan. In either case, certain requirements must be met in the RMP.

Because the Lander Field Office final travel and transportation network is being deferred, the purpose of this appendix is to document the decision-making process used to develop the initial network, provide the basis for future implementation-level decisions, and provide guidelines for making transportation network adjustments throughout the life of the plan. The following items are contained within this appendix:

- A map of the known network of transportation linear features, including modes of travel;
- Long-term management goals and objectives for the transportation system;
- Management objectives for areas or sub-areas where route designations were not completed concurrent with the RMP;
- A process for moving from an interim designation of "limited to existing roads, primitive roads, and trails," to a designation of "limited to designated roads, primitive roads, and trails upon completion of the TMP;"
- Identification of incomplete travel and transportation tasks including:
  - Additional data needs and a strategy to collect needed information;
  - Identification of a clear planning sequence for subsequent road and trail selection and identification, including the public involvement process (focusing on user groups and stakeholders), initial route selection criteria, and constraints; and
  - A schedule to complete the area or sub-area road, primitive road, and trail selection process.

## Travel Management Areas

Map 142 displays the Travel Management Areas in the planning area. These areas represent potential TMP units, or areas where existing travel management decisions are different from the surrounding area. As such, and further discussed in this document, these areas will provide boundaries for the development and prioritization of future TMPs.

## Travel Management Plans

Table W.1, "Travel Management Plan, Priority Rank, Timeframes for Completion, and Interim and Final Travel Restrictions" (p. 1815), lists TMPs, priority rankings, timeframes for completion, interim travel restrictions, and restrictions following development of a TMP.

**Table W.1. Travel Management Plan, Priority Rank, Timeframes for Completion, and Interim and Final Travel Restrictions**

| Travel Management Plan Name | Priority Rank | Timeframe | Interim Travel Restrictions[1] | Final Restrictions After Development of a Travel Management Plan[2] |
|---|---|---|---|---|
| Zone 1 – Twin Creek | 1 | Directly Following the ROD | Motorized travel limited to existing roads and trails identified in Map 112. | Motorized travel limited to designated roads and trails. |
| Zone 2 – Johnny Behind the Rocks | 2 | | Closed to motorized travel. Administrative access will be available to administer | Closed to motorized travel. Administrative access will be available to |

| Travel Management Plan Name | Priority Rank | Timeframe | Interim Travel Restrictions[1] | Final Restrictions After Development of a Travel Management Plan[2] |
|---|---|---|---|---|
| | | | livestock grazing permits, as well as for maintenance and development of the recreation area. Open to mechanized and nonmotorized travel. | administer livestock grazing permits, as well as for maintenance and development of the recreation area. Open to mechanized and nonmotorized travel. |
| Zone 3 – Lander Slope/Red Canyon (including Baldwin Creek WSR and Sinks Canyon Climbing Area) | 3 | Priority Deferred | All travel limited seasonally (dates and travel limitation are defined in Alternative D), overland motorized and mechanized travel is limited to existing roads and trails. Over-snow vehicle travel is open, subject to seasonal limitations. Baldwin Creek is closed to motorized and mechanized travel. Sinks Canyon is closed to motorized travel. | All travel limited seasonally (dates and travel limitation are defined in Alternative D), motorized and mechanized travel limited to designated roads and trails. Over-snow vehicle travel is open, subject to seasonal limitations. Baldwin Creek is closed to motorized and mechanized travel. Sinks Canyon is closed to motorized travel. |
| Zone 4 – Antelope Hills including Sweetwater Canyon WSA | 4 | | Motorized travel limited to existing roads and trails identified in Map 112. In Sweetwater Canyon, motorized travel is limited to roads and trails contained on Map 112. Closed to over-snow motorized vehicle travel. | Motorized travel limited to designated roads and trails. Sweetwater Canyon is closed to over-snow motorized vehicle travel. |
| Zone 5 – The Bus @ Baldwin Creek | 5 | | Closed to motorized travel, open to nonmotorized and mechanized travel. Closed to over-snow motorized vehicle travel. | Closed to motorized travel, open to nonmotorized and mechanized travel. Closed to over-snow motorized vehicle travel. |
| Zone 6 – Dubois Badlands WSA | 6 | | | |
| Zone 6 – Dubois (including East Fork ACEC, Whiskey Mountain ACEC, Whiskey Mountain WSA, and Little Red Creek area) | 6 | | Motorized travel is limited to existing roads and trails.<br><br>In the East Fork ACEC, motorized and mechanized travel is limited seasonally (as | Motorized travel limited to designated roads and trails.<br><br>In the East Fork ACEC, motorized and mechanized travel is limited seasonally (as |

| Travel Management Plan Name | Priority Rank | Timeframe | Interim Travel Restrictions[1] | Final Restrictions After Development of a Travel Management Plan[2] |
|---|---|---|---|---|
| | | | defined in Alternative D) to existing roads and trails.<br><br>In the Whiskey Mountain ACEC, motorized and mechanized travel limited seasonally (as defined in Alternative D) to existing roads and trails.<br><br>The Whiskey Mountain WSA and Little Red Creek area will be closed to motorized travel. | defined in Alternative D) to designated roads and trails.<br><br>Motorized travel is limited to designated roads and trails. In the Whiskey Mountain ACEC, motorized and mechanized travel will be limited seasonally (as defined in Alternative D) to designated roads and trails.<br><br>The Whiskey Mountain WSA and Little Red Creek area will be closed to motorized travel. |
| Zone 7 – Green Mountain | 7 | Priority Deferred | Motorized and mechanized travel limited seasonally to existing roads and trails. | Motorized and mechanized travel limited seasonally to designated roads and trails. |
| Zone 8 – Agate Flats | 8 | | Motorized travel limited to existing roads and trails identified in Map 112. | Motorized travel limited to designated roads and trails. |
| Zone 9 – Sweetwater Rocks WSA | 9 | Deferred | Motorized travel limited to roads and trails contained on Map 112. Closed to over-snow motorized vehicle travel. | Motorized travel limited to designated roads and trails. Closed to over-snow motorized vehicle travel. |
| Zone 10 – Crooks | 10 | | Motorized travel limited to existing roads and trails identified in Map 112. | Motorized travel limited to designated roads and trails. |
| Zone 11 – Copper Mountain WSA | 11 | | Closed to motorized travel. Open to nonmotorized travel. | Closed to motorized travel. Open to nonmotorized travel. |
| Zone 11 – Bridger | 11 | | Motorized travel limited to existing roads and trails identified in Map 112. | Motorized travel limited to designated roads and trails. |
| Zone 12 – Rattlesnake Hills | 12 | | | |
| Zone 13 – Moneta | 13 | | | |

[1] Additional over-snow vehicle restrictions are discussed in the management actions in Chapter 2. These decisions are fully enforced upon the signing of the ROD.

| Travel Management Plan Name | Priority Rank | Timeframe | Interim Travel Restrictions[1] | Final Restrictions After Development of a Travel Management Plan[2] |
|---|---|---|---|---|

[2] Additional restrictions and stipulations on travel might be applied at the TMP stage. These stipulations could include route-specific limitations, such as closing a route seasonally, limiting the type of vehicle or conveyance that can travel the route, and/or other supplementary rules necessary to address planning issues.

ACEC Area of Critical Environmental Concern
ROD Record of Decision
WSA Wilderness Study Area
WSR Wild and Scenic River

**Additional Data and Information Needs for all Lander Field Office TMPs**

Travel management planning across the entire planning area is being deferred primarily due to the need for additional data and information. The following items are needed prior to completing Lander Field Office TMPs:

- Route identification and inventory has been completed for the entire Lander Field Office; however, most of this information was developed through Geographic Information System (GIS)-based layers. All TMPs will need to have some level of spot checking, internal review, and review from stakeholders and members of the general public. This spot-checking and review process is reflected in all TMP timeframes discussed in this document.

- Pursuant to Instruction Memorandum (IM) 2012-067; cultural resource inventory requirements, priorities, and strategies will vary depending on the quality of the existing information, the extent of potential change to the location, the expected density and nature of historic properties, and the potential direct, indirect, and cumulative effects of the route designation, in consultation with the State Historic Preservation Office (SHPO), tribes, and other interested parties. Prior to the development of a TMP, cultural resource specialists will develop an inventory strategy that addresses these factors.

- No area in the planning area has a partial or fully completed TMP. Therefore, all elements associated with a TMP need to be completed for the entire planning area.

- The areas identified for deferred travel planning are tentative planning units. It is possible that adjustments to the boundary of these planning units will be necessary to respond to new information, issues, or considerations. Any adjustments to the area boundaries will be a component of the TMP process, occur early in the planning process, and be subject to public review.

- Finally, all areas in the planning area have RMP objectives that will influence travel planning. Some areas (e.g., Areas of Critical Environmental Concern [ACECs] and Special Recreation Management Areas [SRMAs]) have area- and program-specific objectives. At a minimum, all areas have general travel planning objectives tiered to the designation criteria in 43 CFR §8342.1. It is possible that additional travel planning implementation objectives will need to be developed to respond to new information or considerations. The development of implementation objectives will be a component of the Lander Field Office TMP process, occur early in the planning process, and be subject to public review.

**Detailed Description of TMPs 'Directly Following the Record of Decision (ROD)'**

The following TMPs are identified above for travel management planning directly following the finalization of the ROD (or within 2 years after the completion of the RMP process):

**1. Twin Creek TMP**

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6, LR 7, LR 8, LR 9, LR 11, LR 12, and SD 25

*Objectives:* LR 6.1, LR 7.1, LR 8.1, LR 9.1, LR 12.1-12.3, and SD 25.1-25.4

*Management Actions:* 6044

***Primary Travelers***

Hunters (fall, winter, spring), antler hunters, livestock grazing permittee(s), and private land owners.

**2. Johnny Behind the Rocks TMP**

***RMP goals, objectives, and management actions that will influence travel.***

*Goals:* LR 6 and LR 7

*Objectives:* LR 6.1, LR 6.3, LR 7.1, LR 7.3, LR 11, LR 11.1, LR 12.1-12.3, LR 13.1-13.3, LR 25.1-25.5

*Management Actions:* 6040, 6041, 6081, and RMZ desired future setting descriptions contained in the Lander Community SRMA in Appendix C (p. 1453).

***Primary Travelers***

Upon finalization of the RMP, the primary travelers in this area will be hikers, mountain bikers, horseback riders, trail runners, and livestock grazing permittees.

**Strategy and Task Schedule**

The following is a strategy and general task schedule for the development of these TMPs:

A. Preplanning Information.

A.1. Identify area-specific RMP goals, objectives, and decisions that will influence travel. Identify implementation objectives necessary to respond to new information or considerations.

A.2. Identify primary travelers.

A.3. Develop purpose and need for each area based on A.2-A.3 and designation criteria contained in CFRs.

B. Issue and planning criteria development.

B.1. Develop planning issues associated with A.

B.1.1. Develop indicators in response to planning issues identified in B.1.

B.1.2. Develop route selection criteria (or standards) associated with B.1.1.

B.2. Identify and address data gaps.

C. Within a month after completion of the RMP process, cooperators and the public will have an opportunity to provide comment on the above, as well as the existing route inventory.

D. Evaluate and Refine.

D.1. Evaluate route selection criteria using existing routes as a test case.

D.1.1. Route selection criteria should provide meaningful insight into individual route parameters/impacts and demonstrate variation in the magnitude of route impact.

D.1.2. Route selection criteria should give a picture of the magnitude of the cumulative impact or overall network impact.

D.1.3. Route selection criteria should provide for adaptive responses and analysis parameters for future travel actions, such as, adding roads or trails, or actions to mitigate new issues.

D.2. Present route selection criteria and results, as well as general alternative themes, to cooperators and the public.

D.3. Refine route selection criteria and general alternative themes.

E. Develop impact analysis on No Action Alternative and resource conservation alternatives.

E.1. Route selection criteria applied to No Action Alternative (Alternative A - all routes designated open) and resource conservation alternative (Alternative B - all routes that do not meet selection criteria will be closed).

E.2. Develop impact analysis for alternatives A and B.

E.2.1. Do these alternatives meet the purpose and need?

E.2.2. Drop (considered but not analyzed in detail) alternatives that do not meet the purpose and need.

E.3. Develop and identify standardized mitigation measures (specific to selection criteria) to address impacts associated with routes not meeting criteria.

F. Develop Alternative C (All routes that do not meet route selection criteria are mitigated open) based on step E.3.

G. Develop impact analysis for Alternative C.

H. 30-day review for cooperators and interested public and 5-day workshops to provide input.

I. Develop Preferred Alternative (D).

J. Develop impact analysis for Alternative D.

K. Issue draft TMP with 30-day comment period for the public.

**0 to 2 years after the signing of the ROD:**

L. Respond to public comments.

M. Issue final and decision document.

N. Implementation.

**Detailed Description of Priority Deferred Areas**

The following TMPs are identified above as a priority deferred area for travel planning, meaning planning will be conducted within 3 to 9 years after the completion of the RMP process. The accompanying schedule assumes:

- The Bus @ Baldwin Creek area is being deferred specifically to provide time to resolve management inconsistencies associated with trail development/promotion on State of Wyoming-administered lands in the area. Resolution of this issue could come in the form of a land swap and/or Memorandum of Understanding between the BLM, interested, parties, and the State of Wyoming.
- Existing staffing plus adequate staffing to address ID Team needs, as well as staffing to collect additional inventory information.
- Limited scope creep of TMP, public involvement, and/or National Environmental Policy Act (NEPA) process.
- Full completion of the Twin Creek and Johnny Behind the Rocks TMPs.

**3. Lander Slope/Red Canyon (including Baldwin Creek Wild and Scenic River (WSR) and Sinks Canyon Climbing Area) TMP:** year three (after signing of ROD) inventory, years three to four planning, year four implementation

This TMP does not include the Bus @ Baldwin Creek, which will be a separate TMP.

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6-9, LR 11-12, SD 1-5, SD 7, and SD 10 - 11

*Objectives:* LR 6.1, LR 7.1-7.3, LR 8.1, LR 9.1, LR 12.1-12.3, LR 13.1-13.4, SD 7.1, SD 10.1-10.6, and SD 11.1-11.3

*Management Actions:* 6034, 6043, 6081, 6087, 6098, 6099, 6119, 7032, and desired future setting descriptions for the Sinks Canyon Recreation Management Zone (RMZ) described in Appendix C (p. 1453).

***Primary Travelers***:

Hunters (fall, winter, spring), wood cutters, antler hunters, livestock grazing permittee(s), climbers, and private land owners.

**4. Antelope Hills TMP:** year four (after signing of ROD) inventory, years four to five planning, year six implementation

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6, LR 7, LR 8, LR 9, LR 11, LR 12, SD 1-5, and SD 16

*Objectives:* LR 6.1, 7.1, LR 8.1, LR 9.1, LR 12.1-12.3, SD 1.1-5.6, and SD 16.1-16.3

*Management Actions:* 6044 and 7004, and Congressionally Designated Trails, Sweetwater Mining District, Group Use, and Alkali Basin RMZs desired future setting descriptions contained in Appendix C (p. 1453)

***Primary Travelers***

Hunters (fall, winter, spring), antler hunters, livestock grazing permittee(s), wood cutters, mining operators, oil and gas developers, Continental Divide Trail National Scenic Trail users, handcart trekkers, National Historic Trails enthusiasts and private land owners.

**4. Sweetwater Canyon WSA TMP:** year four (after signing of ROD) inventory, years four to five planning, year six implementation

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6, LR 7, LR 8, LR 11, LR 12, LR 13, and SD 6

*Objectives:* LR 6.1, LR 6.3, LR 7.1-7.3, LR 11.1, LR 11.2, LR 12.1-12.3, LR 13.1-13.4, SD: 6.1, and SD 6.2

*Management Actions:* 6039, 6047, 7022, and RMZ desired future setting descriptions contained in Appendix C (p. 1453).

***Primary Travelers***

Fisherman, hikers, backpackers, horseback riders, hunters, wildlife viewers, and livestock grazing permittee(s).

**5. The Bus @ Baldwin Creek TMP:** year four (after signing of ROD) inventory, years four to five planning, year six implementation

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6, and LR 7

*Objectives:* LR 6.1, LR 6.3, LR 7.1, LR 7.3, LR 11, LR 11.1, LR 12.1-12.3, LR 13.1-13.3, LR 25.1-25.5

*Management Actions:* 6040, 6041, 6081, and RMZ desired future setting descriptions contained in the Lander Community SRMA in Appendix C (p. 1453).

***Primary Travelers***

Hikers, mountain bikers, horseback riders, trail runners, and livestock grazing permittee(s).

**6. Dubois Badlands WSA TMP:** years six to seven (after signing of ROD) inventory, years seven to eight planning, year eight implementation

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6, LR 7, LR 8, LR 11, LR 12, LR 13, and SD 6

*Objectives:* LR 6.1, LR 7.1-7.3, LR 12.1-12.3, LR 13.1-13.4, SD: 6.1, and SD 6.2

*Management Actions:* 6037 and 7022

***Primary Travelers***

Wildlife watchers, hunters (fall, winter, spring), mountain bikers, antler hunters, livestock grazing permittee(s), and private land owners.

**6. Dubois TMP (including East Fork ACEC, Whiskey Mountain ACEC, Whiskey Mountain WSA, and Little Red Creek area):** years six to seven (after signing of ROD) inventory, years seven to eight planning, year eight implementation

***RMP goals, objectives, and decisions that will influence travel.***

*Goal:* PR 8, LR 6-9 LR 11-12, SD 1-5, SD 6-7, SD 12, and SD 13

*Objectives:* PR 8.1, LR 6.1, LR 7.1-7.3, LR 8.1, LR 9.1, LR 12.1-12.3, LR 13.1-13.4, SD 6.1, SD 7.1, and SD 12.1-12.4

*Management Actions:* 6034, 6035, 6039, 6042, 6081, 6087, 6102, 6103, 7022, 7032, 1049 and Dubois Mill-Site RMZ desired future setting described in Appendix C (p. 1453).

***Primary Travelers***

Activities associated with management of bighorn sheep, wildlife watchers, hunters (fall, winter, spring), antler hunters, livestock grazing permittee(s), and private land owners.

**7. Green Mountain TMP:** years eight to nine (after signing of ROD) inventory, years nine to ten planning, year ten implementation.

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6, LR 7, LR 8, LR 11, LR 12, SD 15

*Objectives:* LR: 6.1, LR 7.1-7.3, LR 12.1-12.3, and SD 15.1-15.4

*Management Actions:* 6034

***Primary Travelers***

Hunters (fall, winter, spring), wood cutters, antler hunters, livestock grazing permittee(s), private land owners, mining operators, oil and gas developers, and Continental Divide National Scenic Trail hikers.

**8. Agate Flats TMP:** years ten to eleven inventory (after signing of ROD), years eleven to twelve planning, year twelve implementation

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6, LR 7, LR 8, LR 9, LR 11, LR 12, SD 1-5, SD 16, and SD 23

*Objectives:* LR 6.1, LR 7.1, LR 8.1, LR 9.1, LR 12.1-12.3, SD 1.1-5.6, SD 16.1-16.3, SD 23.1-23.3

*Management Actions:* 7004 and Sweetwater Rocks RMZ desired future setting descriptions contained in Appendix C (p. 1453).

***Primary Travelers***

Hunters (fall), livestock grazing permittee(s), mining operators, oil and gas developers, National Historic Trails enthusiasts, and private land owners.

**9. Sweetwater Rocks WSA TMP:** years ten to eleven inventory, years eleven to twelve planning, year twelve implementation

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6, LR 7, LR 8, LR 11, LR 12, LR 13, and SD 6

*Objectives:* LR 6.1, LR 6.3, LR 7.1-7.3, LR 11.1, LR 11.2, LR 12.1-12.3, LR 13.1-13.4, SD 6.1-6.2, and SD 23.1-23.3

*Management Actions:* 6039, 6081, 7022, and Sweetwater Rocks RMZ desired future setting descriptions in Appendix C (p. 1453).

***Primary Travelers***

Fall hunters, hikers, backpackers, climbers, horseback riders, wildlife viewers, livestock grazing permittee(s), and access to private in-holdings.

**Strategy and Task Schedule**

The following is a strategy and general task schedule for the development of these TMPs:

A. Preplanning

A.1. Adjust TMP boundaries as necessary to respond to new information or considerations.

A.2. Identify existing RMP goals, objectives, and decisions that will influence travel.

A.3. Identify implementation objectives necessary to respond to new information or considerations.

A.4. Identify primary travelers.

A.5. Develop purpose and need based on A.2-A.3 and designation criteria contained in CFRs.

B. Issue and planning criteria development.

B.1. Develop planning issues associated with A.2-A.4.

B.1.1. Develop indicators in response to planning issues identified in B.1.

B.1.2. Develop route selection criteria (or standards) associated with B.1.1.

B.1.3. Identify and address data gaps.

C. Public comment on above and existing route inventory.

D. Evaluate and Refine.

D.1. Evaluate route selection criteria using existing routes as a test case.

D.1.1. Route selection criteria should provide meaningful insight into individual route parameters/impacts and demonstrate variation in the magnitude of route impact.

D.1.2. Route selection criteria should give a picture of the magnitude of the cumulative impact or overall network impact.

D.1.3. Route selection criteria should provide for adaptive responses and analysis parameters for future travel actions such as, adding roads or trails, or actions to mitigate new issues.

D.2. Present route selection criteria and results, as well as general alternative themes, to cooperators and the public.

D.3. Refine route selection criteria and general alternative themes.

E. Impact analysis on No Action Alternative and resource conservation alternatives.

E.1. Route selection criteria applied to No Action Alternative (Alternative A - all routes designated open) and resource conservation alternative (Alternative B - All routes that do not meet selection criteria will be closed).

E.2. Develop impact analysis for alternatives A and B.

E.2.1. Do these alternatives meet the purpose and need?

E.2.2. Drop (considered but not analyzed in detail) alternatives that do not meet the purpose and need.

E.3. Develop and identify standardized mitigation measures (specific to selection criteria) to address impacts associated with routes not meeting criteria.

F. Develop Alternative C (All routes that do not meet route selection criteria are mitigated open.) based on step E.3

G. Develop impact analysis for Alternative C.

H. 30-day review for cooperators and interested public, and 5-day workshops to provide input.

I. Develop Preferred Alternative (D)

J. Develop impact analysis for Alternative D.

K. Issue draft TMP and 30-day comment period for the public.

L. Respond to public comments.

M. Issue final and FONSI Decision Record.

**Deferred Areas**

The following TMPs are identified above as a 'deferred area' for travel planning, meaning planning will be conducted 9 to 19 years after the completion of the RMP process. The accompanying schedule assumes:

- Existing staffing in addition to adequate staffing to address ID Team needs, as well as staffing to collect additional inventory information.
- Limited scope creep of TMP, public involvement, and/or NEPA process.
- Full completion of the higher priority TMPs.

**10. Crooks TMP:** years twelve to thirteen inventory (after signing of ROD), years thirteen to fourteen planning, year fourteen implementation

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6, LR 7, LR 8, LR 9, LR 11, LR 12, SD 1-5, and SD 16

*Objectives:* LR 6.1, LR 7.1, LR 8.1, LR 9.1, LR 12.1-12.3, SD 1.1-5.6, and SD 16.1-16.3

*Management Actions:* 6044

***Primary Travelers***

Hunters (fall, winter, spring), wood cutters, antler hunters, livestock grazing permitee(s), mining operators, oil and gas developers, Continental Divide National Scenic Trail hikers, and private land owners.

**11. Copper Mountain WSA TMP:** years fourteen to fifteen (after signing of ROD) inventory, years fifteen to sixteen planning, year sixteen implementation

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6, LR 7, LR 8, LR 11, LR 12, LR 13, and SD 6

*Objectives:* LR 6.1, LR 7.1-7.3, LR 12.1-12.3, LR 13.1-13.4, SD 6.1, and SD 6.2

*Management Actions:* 6039 and 7022

***Primary Travelers***

Hunters and livestock grazing permittee(s).

**11. Bridger TMP:** years fourteen to fifteen (after signing of ROD) inventory, years fifteen to sixteen planning, year sixteen implementation

**RMP goals, objectives, and decisions that will influence travel.**

*Goals:* LR 6, LR 7, LR 8, LR 9, LR 11, and LR 12

*Objectives:* LR 6.1, LR 7.1, LR 8.1, LR 9.1, and LR 12.1-12.3

*Management Actions:* 6044

***Primary Travelers***

Hunters (fall, winter, spring), antler hunters, livestock grazing permittee(s), mining operators, oil and gas developers, and private land owners.

**12. Rattlesnake Hills TMP:** years sixteen to seventeen inventory (after signing of ROD), years seventeen to eighteen planning, year eighteen implementation

***RMP goals, objectives, and decisions that will influence travel.***

*Goals:* LR 6, LR 7, LR 8, LR 9, LR 11, and LR 12

*Objectives:* LR 6.1, LR 7.1, LR 8,1, LR 9.1, and LR 12.1-12.3

*Management Actions:* 6044

***Primary Travelers***

Hunters (fall, winter, spring), wood cutters, antler hunters, livestock grazing permittee(s), mining operators, oil and gas developers, and private land owners.

**13. Moneta TMP:** years eighteen to nineteen inventory (after signing of ROD), years nineteen to twenty planning, year twenty-one implementation

**RMP goals, objectives, and decisions that will influence travel.**

*Goals:* LR 6, LR 7, LR 8, LR 9 LR 11, and LR 12

*Objectives:* LR 6.1, LR 7.1, LR 8,1, LR 9.1, and LR 12.1-12.3

*Management Actions:* 6044

***Primary Travelers***

Hunters (fall, winter, spring), livestock grazing permittee(s), mining operators, oil and gas developers, and private land owners.

**Strategy and Task Schedule**

The strategy and task schedule for these areas will be the same as that identified for the priority deferred areas.

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# Appendix X. Comment Analysis

## X.1. Introduction

On September 9, 2011, the Bureau of Land Management (BLM) published the Notice of Availability (NOA) in the Federal Register announcing the release of the Draft Resource Management Plan (RMP) and Environmental Impact Statement (EIS) for the Lander Field Office planning area. The NOA initiated the 90-day public comment period. At the request of the public and cooperating agencies, the BLM extended the comment period by 45 days, for a total comment period of 135 days. The public comment period ended on January 20, 2012. During the public comment period, the BLM hosted three commenting workshops in September 2011 and five public meetings in October 2011 in towns and cities throughout the planning area. The commenting workshops informed readers how to navigate the Draft RMP and EIS, and how to prepare and submit substantive comments. At the October public meetings, the BLM gathered public comments on the Draft RMP and EIS, and agency representatives were available at the meetings to answer questions from the public.

During the public comment period, the BLM received 262 unique comment documents and more than 25,000 form letters. This report summarizes the full range of issues and concerns as submitted by the public during the comment period. The submitted comments and summaries presented in this report do not necessarily represent the sentiments of the public as a whole. However, this summary does attempt to provide fair representation of the wide range of views submitted during the public comment period. In consideration of these views, it is important for the public and decision makers to understand that this process does not attempt to treat input as if it were a vote. Instead, comment analysis is a process that allows the BLM to review and consider received comments, develop appropriate responses, revise the Draft RMP and EIS in response to comments, and support the BLM's decision-making process.

The remainder of this report is organized as follows:

- **Comment Analysis Process** – Describes how the BLM received, recorded, and categorized comment documents and comments.
- **Commenter Demographics** – Presents demographic information associated with submitted comment documents, including geography and affiliation of commenters.
- **Analysis of Comments** – Provides a breakdown of the number of comments received by issue category, a summary of comments received, and a summary of the BLM's response to comments received.

This report refers to two attachments which are available on the RMP project website (http://www.blm.gov/wy/st/en/programs/Planning/rmps/lander.html):

- **Attachment A: Commenter Index** – Includes instructions on how to use the tables in Attachment A and Attachment B. It also includes an index listing the names of all commenters and their associated comment document number.
- **Attachment B: Individual Comments and Index to Summary Comments and Summary Responses** – Includes all substantive public comments received during the public comment period along with an index to help users find their associated summary comments and response.

# X.2. Comment Analysis Process

The BLM used a systematic process to compile, categorize, and evaluate written comments from individuals, federal and state agencies, tribal governments, elected representatives, and other organizations on the Draft RMP and EIS to identify substantive issues for review and response by BLM decision-makers. The comment analysis process provides a methodical approach for the BLM to revise text in the Draft RMP and EIS based on comments provided during the public comment period. Additionally, through the comment analysis process, the BLM supplemented the project mailing list, and compiled demographic information on the geographic distribution of commenters.

Public comment documents include hardcopy comments received at the public meetings, and electronic or written comment documents postmarked within the 135-day public comment period. Methods of comment document submittal included U.S. mail, e-mail, fax, and public meetings. All individuals attending public meetings were encouraged to submit comments in writing. The entire written submission from a commenter (e.g., full letter or e-mail) is referred to as a "public comment document"; an individual and identifiable substantive expression of interest or issue statement included in a public comment document is referred to as a "comment." For example, a letter (i.e., public comment document) received within the public comment period might have included one or more separate comments. ”Commenter” refers to the individual or organization who submitted the comment document.

## X.2.1. Analysis Process

The BLM comment analysis team used the software program CommentWorks®, an online comment tracking and analysis platform, to catalogue, number, review, categorize, and respond to public comments on the Draft RMP and EIS.

Upon receipt of a public comment document, a member of the comment analysis team logged the comment document into a comment tracking spreadsheet, assigned the document a unique identifier (e.g., Document 10001), and converted the comment document to a searchable electronic (i.e., PDF) document. The analysis team then added all pertinent commenter information (e.g., name, affiliation, address, and type of comment document) into CommentWorks® and uploaded the electronic documents to the system.

The first step in the analysis process was to identify individual substantive comments within a public comment document. The comment analysis team identified each substantive comment based on guidance in the BLM National Environmental Policy Act (NEPA) Handbook (H-1790-1). Substantive comments are those that do one or more of the following:

- Question, with reasonable basis, the accuracy of information in the RMP and EIS
- Question, with reasonable basis, the adequacy of, methodology for, or assumptions used for the environmental analysis
- Present new information relevant to the analysis
- Present reasonable alternatives other than those analyzed in the RMP and EIS
- Cause changes or revisions in one or more of the alternatives

Comments not considered substantive included the following:

- Comments in favor of or against the Proposed Action or alternatives without reasoning that meet the substantive comment criteria listed above

- Comments that only agree or disagree with BLM policy or resource decisions without justification or supporting data that meet the substantive criteria listed above
- Comments that do not pertain to the planning area or scope of the RMP and EIS
- Comments that take the form of vague, open-ended questions

Based on the comments respondents received and on legal guidance, the analysis team established an issue coding structure for all substantive comments within CommentWorks® and used the coding structure to bracket and sort comments into logical groups or issue categories (e.g., air quality, cumulative impacts, and cultural resources). Table X.1, " Issue Categories" (p. 1831) lists all issue categories identified for the Draft RMP and EIS.

**Table X.1. Issue Categories**

| Issue Categories | | |
|---|---|---|
| Air Resources | Invasive Species | Salable Minerals |
| Areas of Critical Environmental Concern | Lands and Realty | Socioeconomic |
| Climate Change | Laws, Regulations, Guidance, Process | Soil |
| Congressionally Designated Trails | Livestock Grazing Management | Special Status Species |
| Cultural Resources | Leasable Minerals – Geothermal | Trails and Travel Management |
| Cumulative Impacts | Leasable Minerals – Oil and Gas | Vegetation |
| Editorial, Readability, and Data Issues | Leasable Minerals – Oil Shale | Visual Resource Management |
| Environmental Justice | Leasable Minerals – Other Solid Leasable Minerals | Water |
| Extension and Hard Copy Request | Locatable Minerals | Wild and Scenic Rivers |
| Fire and Fuels Management | Recreation | Wild Horses |
| Fish | Renewable Energy | Wilderness Characteristics |
| Greater Sage-Grouse | Rights-of-Way and Corridors | Wilderness Study Areas |
| Health and Safety | Riparian-Wetland | Wildlife |

The BLM Interdisciplinary Team reviewed individual comments after the comments were assigned to an issue category, and provided direction to develop a response. The comment analysis team then used the individual comments and Interdisciplinary Team direction to analyze, group, and summarize comments, and to develop responses to the summary comments.

When reviewing comments, the analysis team looked not only for each action or change requested by the public, but also for any supporting information to capture the comment and its context in its entirety. In doing so, paragraphs within a comment document might have been divided into several comments because the paragraphs contained more than one comment; conversely, multiple sections of a comment document might have been combined to form one coherent comment.

It is important to note that during the process of identifying individual comments and concerns, the BLM treated all comments equally. The BLM did not weight comments based on organizational affiliation or status of commenters, and the number of duplicate comments did not increase the priority or merit of one comment over another. The process was not one of "counting votes," and the BLM did not make any effort to tabulate the exact number of people for or against any given aspect of the Draft RMP and EIS. Rather, the BLM focused on an understanding of the content of a comment, how it related to the Draft RMP and EIS, and appropriate responses and revisions to the Draft RMP and EIS.

# X.3. Commenter Demographics

This section summarizes commenter demographics based on information provided in comment documents. Demographic analysis allows the BLM to form an overall picture of issues, and a

better understanding of who is submitting comments, the geographic distribution of commenters, their affiliations, and the format of the public comment documents.

## X.3.1. Geographic Representation

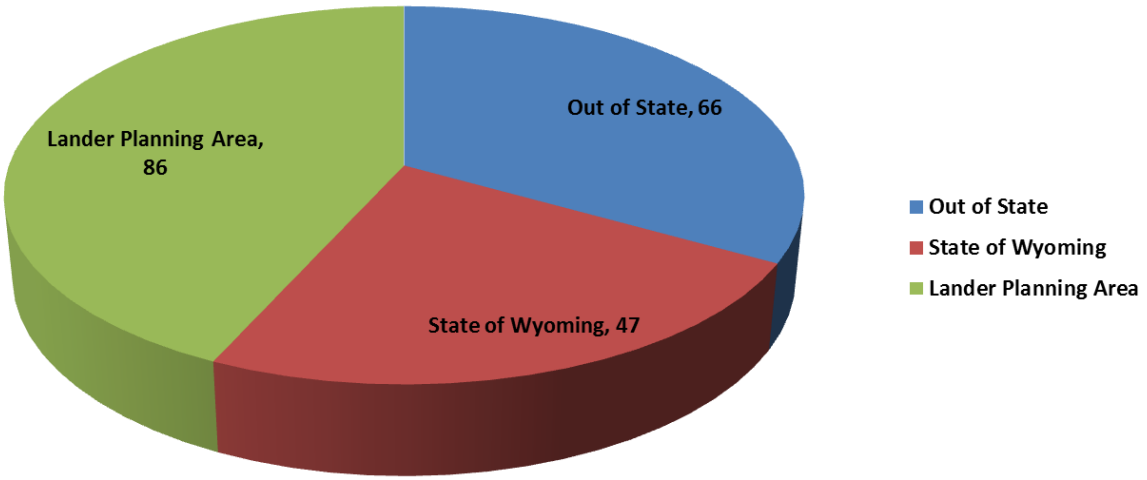
The BLM tracked the geographic representation for each comment document that included such information. Table X.2, "Number of Commenters by Geographic Location" (p. 1832) identifies the number of comment documents received from individual geographic locations (excluding form letters). Figure X.1, "Number of Comment Documents by Geography" (p. 1833) depicts the geographic distribution of comment documents received from within the planning area, from outside the planning area but within the State of Wyoming, and from outside Wyoming. The BLM received the most comment documents from commenters within the planning area.

**Table X.2. Number of Commenters by Geographic Location**

| State | City | Number of Commenters |
|---|---|---|
| Alaska | Anchorage | 2 |
| Arizona | Apache Junction | 1 |
| California | Healdsburg | 1 |
| California | Los Angeles | 1 |
| California | Oroville | 1 |
| California | Santa Rosa | 1 |
| California | Santa Ynez | 1 |
| California | West Hollywood | 1 |
| Colorado | Colorado Springs | 1 |
| Colorado | Denver | 8 |
| Colorado | Fort Collins | 1 |
| Colorado | Golden | 1 |
| Colorado | Lakewood | 1 |
| Colorado | LaSalle | 1 |
| Colorado | Loveland | 1 |
| District of Columbia | Washington | 1 |
| Florida | Miami | 2 |
| Iowa | Monticello | 1 |
| Idaho | Idaho City | 1 |
| Idaho | McCall | 1 |
| Illinois | Bartelso | 1 |
| Illinois | Chicago | 1 |
| Massachusetts | Millville | 1 |
| Massachusetts | Tewksbury | 1 |
| Maryland | Baltimore | 2 |
| Maryland | Chevy Chase | 1 |
| Maine | Fredericton | 1 |
| Missouri | Independence | 2 |
| Montana | Helena | 1 |
| Montana | Missoula | 1 |
| New Mexico | Albuquerque | 3 |
| New Mexico | Deming | 1 |
| Nevada | Las Vegas | 1 |
| New York | Canadaigua | 2 |
| Ohio | Cutler | 1 |
| Ohio | Willoughby | 1 |
| Oklahoma | Oklahoma City | 1 |

| State | City | Number of Commenters |
|---|---|---|
| Oregon | Klamath Falls | 1 |
| Pennsylvania | Pottstown | 1 |
| Tennessee | Knoxville | 1 |
| Texas | Austin | 1 |
| Texas | Dallas | 1 |
| Texas | Midland | 1 |
| Utah | Logan City | 1 |
| Utah | Salt Lake City | 1 |
| Virginia | Arlington | 1 |
| Washington | Cameno Island | 1 |
| Washington | Deer Park | 1 |
| Washington | Monroe | 1 |
| Wisconsin | Delafield | 1 |
| Wisconsin | Madison | 1 |
| Wisconsin | Sturgeon Bay | 1 |
| Wyoming | Alcova | 1 |
| Wyoming | Atlantic City | 1 |
| Wyoming | Bairoil | 2 |
| Wyoming | Basin | 1 |
| Wyoming | Casper | 2 |
| Wyoming | Cheyenne | 13 |
| Wyoming | Cody | 4 |
| Wyoming | Dubois | 8 |
| Wyoming | Green River | 1 |
| Wyoming | Jackson | 1 |
| Wyoming | Jeffrey City | 2 |
| Wyoming | Lander | 62 |
| Wyoming | Laramie | 8 |
| Wyoming | Moose | 1 |
| Wyoming | Moran | 1 |
| Wyoming | Pinedale | 2 |
| Wyoming | Powell | 2 |
| Wyoming | Rawlins | 4 |
| Wyoming | Reliance | 1 |
| Wyoming | Riverton | 11 |
| Wyoming | Sheridan | 1 |
| Wyoming | Shoshoni | 2 |
| Wyoming | Thermopolis | 1 |
| Wyoming | - | 1 |
| **Total** | | **199** |

Note: Comments received through e-mail that did not include mailing addresses or geographic representation accounted for 63 submissions.
Note: Form letters were counted once based on the geographic location of the originating entity for the master form letter.




Note: Comments received through e-mail that did not include mailing addresses or geographic representation accounted for 63 submissions.
Note: Form letters were counted once based on the geographic location of the originating entity for the master form letter.

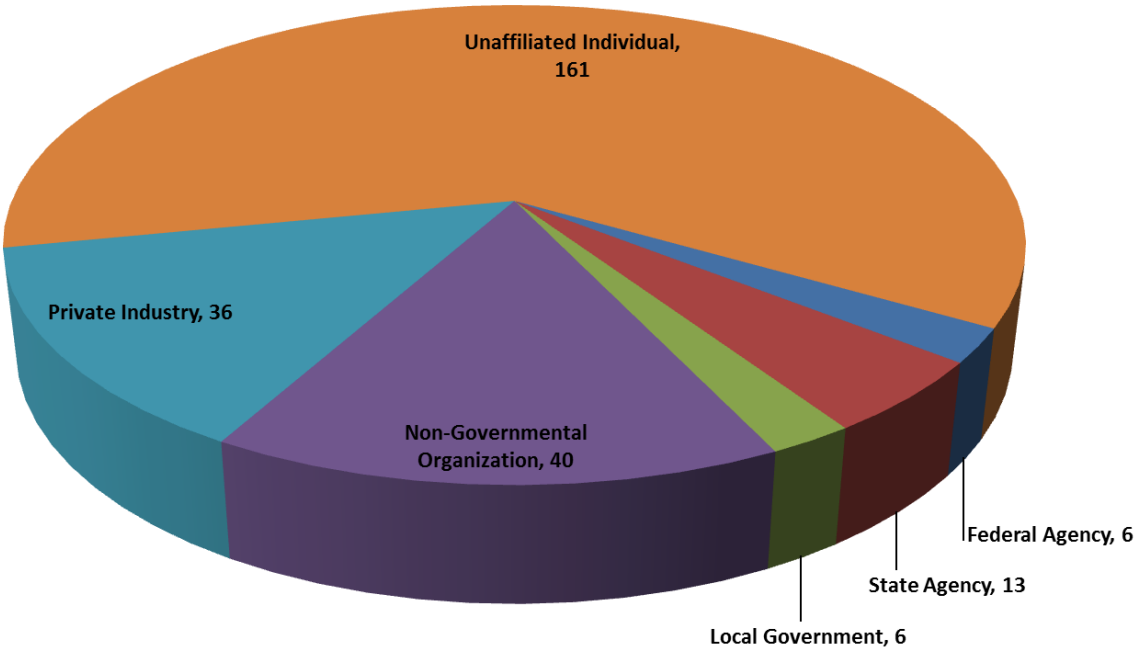
**Figure X.1. Number of Comment Documents by Geography**

## X.3.2. Organizational Affiliation

The BLM received comments from a range of entities, as listed in Table X.3, "Number of Comment Documents by Affiliation (excluding form letters)" (p. 1834) and shown on Figure X.1, "Number of Comment Documents by Geography" (p. 1833). The BLM affiliated comment documents with a government or non-governmental organization if the comment document was received on official letterhead or was received through an official agency or organization e-mail address. The BLM classified all other comment documents as unaffiliated individuals. The BLM received the most comment documents from unaffiliated individuals.

**Table X.3. Number of Comment Documents by Affiliation (excluding form letters)**

| Affiliation | Number of Public Response Documents |
|---|---|
| Federal Agency | 6 |
| State Agency | 13 |
| Local Government | 6 |
| Non-Governmental Organization | 40 |
| Private Industry | 36 |
| Unaffiliated Individual | 161 |
| **Total** | **262** |
| Note: Form letters were counted once based on the geographic location of the originating entity for the master form letter. | |




Note: Form letters were counted once based on the geographic location of the originating entity for the master form letter.

**Figure X.2. Number of Comment Documents by Affiliation**

## X.3.3. Public Comment Document Method of Delivery

The BLM received comment documents through a variety of delivery methods, as listed in Table X.4, "Number of Public Comment Documents by Method of Delivery" (p. 1835). The BLM received the most comment documents through e-mail (190) and U.S. Mail (69).

**Table X.4. Number of Public Comment Documents by Method of Delivery**

| Method of Delivery | Number |
|---|---|
| E-mail | 190 |
| U.S. Mail | 69 |
| Fax | 3 |
| **Total** | **262** |

## X.3.4. Form Letters

The BLM received approximately 25,000 form letters. Form letters are standardized and duplicated letters that contain the same text or portions of text and comments. The BLM reviewed the form letters and extracted and analyzed any comments unique and supplemental to the form letter; however, the BLM considered comments with the same text as one comment. The BLM designated the first form letter from each originating entity as the "master" comment document and reviewed each subsequent form letter to ensure the content was identical to the master comment document. The BLM received form letters from the Greater Yellowstone Coalition,

Sierra Club, and two unknown entities, for a total of four master comment documents. The BLM received seven form letters via U.S. mail; all other form letters arrived via e-mail. When form letters included additional text, the BLM reviewed and processed them if they contained substantive individual comments.

# X.4. Analysis of Comments

The 262 public comment documents contained substantive and non-substantive comments. Representative non-substantive comments included requests to be added to the project mailing list, requests for a copy of the Draft RMP and EIS, personal preference or opinion, unsupported comments and questions, and comments outside the scope of the Draft RMP and EIS.

In accordance with the BLM NEPA Handbook (H-1790-1), the BLM analyzed and responded to comments on the Lander Draft RMP and EIS if they were substantive and related to inadequacies or inaccuracies in the analysis or methodologies used; identified new impacts or recommended reasonable new alternatives or mitigation measures; or involved substantive disagreements on interpretations of significance. (See 40 Code of Federal Regulation 1502.19, 1503.3, 1503.4, 1506.6, and 516 DM 4.17). BLM NEPA Handbook (H-1790-1) identifies the following comment category examples and appropriate responses:

**Substantive Comments**

- **Question, with a reasonable basis, the accuracy of the information in the EIS**. Factual corrections should be made in the Proposed RMP and Final EIS in response to comments that identify inaccuracies or discrepancies in factual information, data, or analysis.
- **Question, with a reasonable basis, the adequacy of environmental analysis as presented**. Comments that express a professional disagreement with the conclusions of the analysis or assert that the analysis is inadequate might or might not lead to changes in the EIS. Interpretations of analyses should be based on professional expertise. Where there is disagreement within a professional discipline, a careful review of the various interpretations is warranted. In some cases, public comments might necessitate an evaluation of analytical conclusions. If, after reevaluation, the manager responsible for preparing the EIS does not think a change is warranted, the response should provide the rationale for that conclusion.
- **Identify New Impacts, Alternatives, or Mitigation Measures**. If public comments on a Draft RMP and EIS identify impacts, alternatives, or mitigation measures that were not addressed in the draft, the manager responsible for preparing the RMP and EIS should determine if they warrant further consideration. If they do, that manager must determine whether the new impacts, new alternatives, or new mitigation measures should be analyzed in either the Proposed RMP and Final EIS, a supplement to the Draft RMP and EIS, or a completely revised and recirculated Draft RMP and EIS.
- **Disagree with Significance Determinations**. Comments might directly or indirectly question determinations regarding the significance or severity of impacts. A reevaluation of these determinations could be warranted and might lead to changes in the Proposed RMP and Final EIS. If, after reevaluation, the manager responsible for preparing the EIS does not think a change is warranted, the response should provide the rationale for that conclusion.

**Non-Substantive Comments**

- **Express Personal Preferences**. Comments that express personal preferences or opinions on the proposal do not require further agency action. They are summarized whenever possible and brought to the attention of the manager responsible for preparing the RMP and EIS.

Although personal preferences and opinions might influence the final selection of the agency's preferred action, they generally will not affect the analysis.

- **Other**. In addition to the five categories from the NEPA Handbook described above, the BLM added a sixth category named "other" which includes requests for copies of the Draft RMP and EIS, requests to be added to the project mailing list, and comments outside the scope of the RMP and EIS. These comments are considered non-substantive and do not require further agency action.

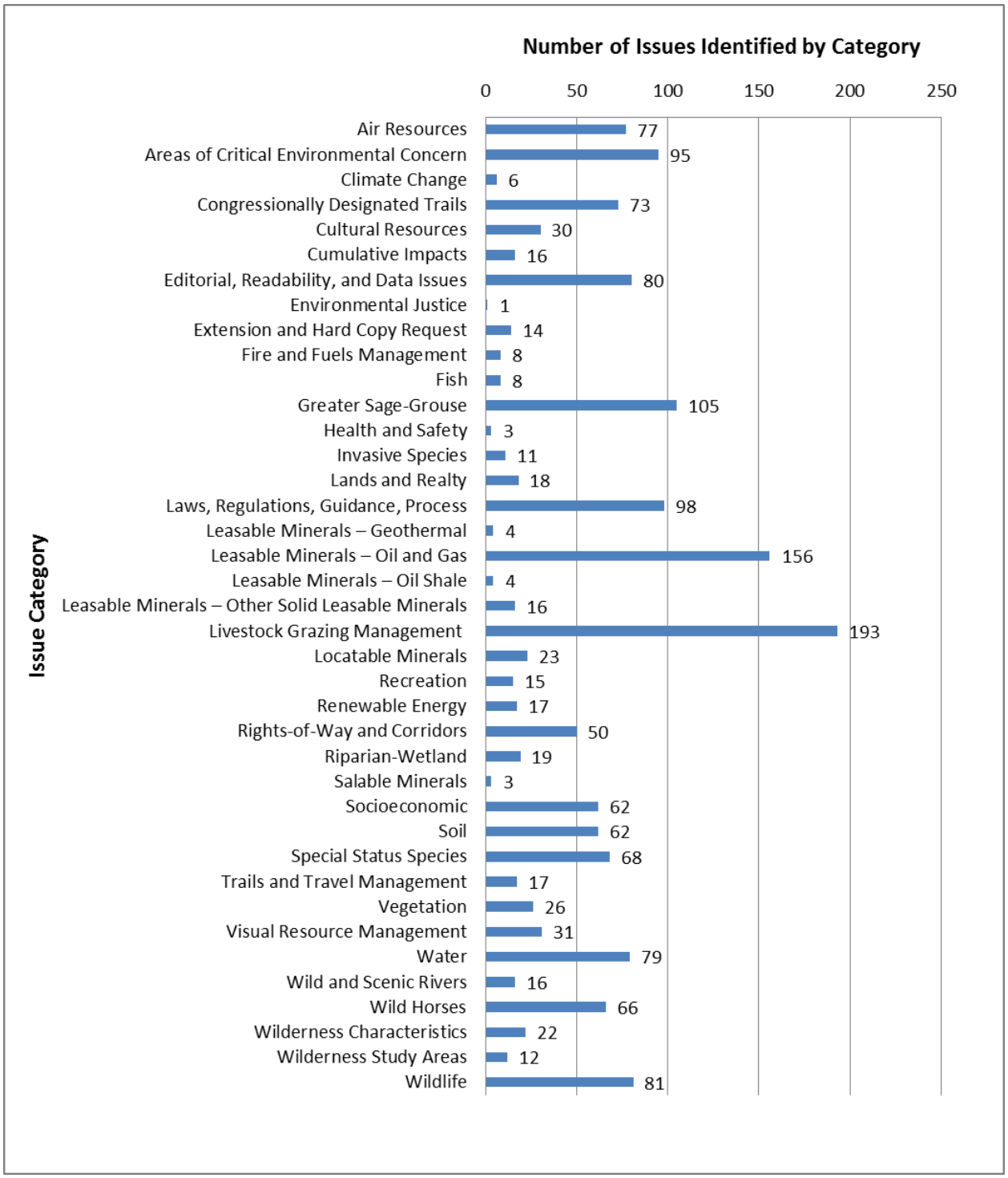
## X.4.1. Comment Submittals by Issue Category

Within the 262 received comment documents, the BLM identified 1,685 individual substantive comments covering a broad range of issue categories. The greatest number of substantive comments was associated with livestock grazing management (193), oil and gas (156), and greater sage-grouse (105). Attachment A includes an index for users to identify their comment documents, and Attachment B includes all individual substantive comments and an index for users to identify the corresponding BLM summary comments and responses (available on the Lander RMP project website http://www.blm.gov/wy/st/en/programs/Planning/rmps/lander.html). Table X.5, "Number of Comments per Issue Category" (p. 1837) and Figure X.3, "Number of Individual Comments by Issue Category" (p. 1838) identify the number of comments submitted by issue category.

**Table X.5. Number of Comments per Issue Category**

| Issue Category | Number of Comments Per Issue Category |
|---|---|
| Air Resources | 77 |
| Areas of Critical Environmental Concern | 95 |
| Climate Change | 6 |
| Congressionally Designated Trails | 73 |
| Cultural Resources | 30 |
| Cumulative Impacts | 16 |
| Editorial, Readability, and Data Issues | 80 |
| Environmental Justice | 1 |
| Extension and Hard Copy Request | 14 |
| Fire and Fuels Management | 8 |
| Fish | 8 |
| Greater Sage-Grouse | 105 |
| Health and Safety | 3 |
| Invasive Species | 11 |
| Lands and Realty | 18 |
| Laws, Regulations, Guidance, Process | 98 |
| Leasable Minerals – Geothermal | 4 |
| Leasable Minerals – Oil and Gas | 156 |
| Leasable Minerals – Oil Shale | 4 |
| Leasable Minerals – Other Solid Leasable Minerals | 16 |
| Livestock Grazing Management | 193 |
| Locatable Minerals | 23 |
| Recreation | 15 |
| Renewable Energy | 17 |
| Rights-of-Way and Corridors | 50 |
| Riparian-Wetland | 19 |
| Salable Minerals | 3 |
| Socioeconomic | 62 |

| Issue Category | Number of Comments Per Issue Category |
|---|---|
| Soil | 62 |
| Special Status Species | 68 |
| Trails and Travel Management | 17 |
| Vegetation | 26 |
| Visual Resource Management | 31 |
| Water | 79 |
| Wild and Scenic Rivers | 16 |
| Wild Horses | 66 |
| Wilderness Characteristics | 22 |
| Wilderness Study Areas | 12 |
| Wildlife | 81 |
| **Total** | **1,685** |
| Note: Duplicative comments in form letters were only counted once. | |




Note: Duplicative comments in form letters were only counted once.

**Figure X.3. Number of Individual Comments by Issue Category**

## X.4.2. Substantive Comment Summary and Response

To provide a user-friendly method of understanding the broad themes and topics of concern expressed in the substantive comments, the BLM grouped individual comments with similar topics and concerns and developed 63 summary comments and responses. Table X.6, "Comment and Response Summaries" (p. 1841) lists the 63 summary comments and responses generally organized by BLM resource program and other appropriate issue categories (e.g., extension and hard copy requests), as described in Table X.1, " Issue Categories" (p. 1831). The summary numbers in Table X.6, "Comment and Response Summaries" (p. 1841) can be used to track the summary comment and response to the individual comments presented in Attachment B (available on the Lander RMP project website http://www.blm.gov/wy/st/en/programs/Planning/rmps/lander.html).

## Table X.6. Comment and Response Summaries

| Issue | Summary Number | Summary Comment | Summary Response |
|---|---|---|---|
| Air Quality | 2001-1 | Commenters stated that there are various instances of inadequate, inaccurate, or insufficient information and/or data throughout the air quality impact analysis. Specifically, commenters asserted that use of data from only four air monitoring stations in the planning area and the limited amount of available air quality data from sources in and adjacent to the planning area provided inadequate data for use in completing an accurate analysis.<br><br>Commenters requested the Bureau of Land Management (BLM) provide additional information, including (1) the methods and criteria used in analyzing air quality in the planning area, (2) justification of the ability of monitoring sites to adequately characterize air quality in the planning area, and (3) disclosure of the associated costs of implementing air quality mitigation.<br><br>Additionally, commenters offered technical corrections to various statements made in the air quality analysis, requested inclusion of Class 1 areas in and adjacent to the planning area, requested data regarding uranium mining, and suggested addressing carbon dioxide ($CO_2$) sequestration. | The BLM updated the air quality sections in the Proposed RMP and Final EIS, Appendix F (p. 1491), and Appendix U (p. 1651) to respond to comments, as appropriate. Updates include, but are not limited to, the following: technical data and references were corrected associated with the most recent National Emissions Inventory, National Ambient Air Quality Standards (NAAQS), and ozone exceedances, standards, and chemistry. Appendix F (p. 1491) addresses ambient air monitoring commitments in the planning area.<br><br>Project proponents are responsible for incurring the costs associated with their proposed actions. Every management action is unique, and might or might not have requirements or mitigation measures developed to protect resources. Any such measures would be within the purview of existing rules and regulations and within the BLM's authority in accordance with the Federal Land Policy and Management Act (FLPMA). Additionally, without knowing the specifics of future management actions, the BLM cannot estimate or assign a cost to such actions.<br><br>The BLM incorporated Class I and II areas within 40 miles of the planning area in Appendix F (p. 1491), and updated the rights-of-way (ROW) sections to include $CO_2$ sequestration management. The BLM does not have accurate data for emissions associated with uranium open-pit mining. |
| Air Quality | 2001-2 | Commenters questioned the authority of the BLM to regulate air quality and require air quality mitigation measures in the region, and the State of Wyoming overall. Commenters requested additional references to applicable air quality laws and policies (specifically the 2011 Memorandum of Understanding [MOU] between the Environmental Protection Agency (EPA), the U.S, Department of the Interior, and the U.S. Department of Agriculture), and that management demonstrate compliance with Wyoming Department of Environmental Quality (DEQ) regulations and other applicable regulations. Specifically, commenters requested additional text clarifying the scope of BLM's authority in regulating air quality and that the Lander | The BLM has air resource management obligations and responsibilities under the National Environmental Policy Act (NEPA), FLPMA, and the Clean Air Act (CAA) and cannot authorize any action that would not comply with any state or federal regulation. Specifically, FLPMA requires in Section 202 [43 United States Code (U.S.C.) 1712 (c)(8)]: *compliance with applicable pollution control laws, including state and Federal air, water, noise, or other pollution standards or implementation plans*.<br><br>The BLM is not attempting to regulate air quality or to supersede Wyoming DEQ's authority. The BLM goals and |

| Issue | Summary Number | Summary Comment | Summary Response |
|---|---|---|---|
| | | RMP be consistent with conditions established in the 2011 MOU.<br><br>Additionally, commenters requested the BLM include additional details outlining how stated goals and objectives for air quality management in the planning area will be accomplished, specifically regarding future oil and gas developments and associated impacts to air quality. | objectives were developed as required by the NEPA process for each resource identified in scoping, and were agreed to in a cooperating agency process that included Wyoming DEQ and EPA. The goals identified by the BLM do not interfere with Wyoming DEQ's authority and indicate that the BLM will comply with state regulations.<br><br>The BLM believes the Proposed RMP and Final EIS are consistent with the 2011 MOU, and the BLM will continue to abide by the processes and recommendations outlined in the MOU. The decision to model a particular project or geographic area is made case by case and depends on availability of input data, geographic and meteorological conditions, current state of air quality, and proximity of sensitive air sheds or receptors.<br><br>The BLM has authority to require Best Management Practices (BMPs), Conditions of Approval (COAs), or other measures determined in cooperation with other federal land management and regulatory agencies (including EPA and Wyoming DEQ), if management actions have the potential to adversely or substantially impact any resource area, including air resources. BMPs, mitigation measures, and COAs are project-specific and will be identified in subsequent NEPA documents addressing such projects.<br><br>The Lander Air Management Plan in Appendix F (p. 1491) includes requirements for emissions inventories, monitoring, and modeling. Project-specific requirements will be determined during the development of an EIS and subsequent Record of Decision (ROD) for major oil and gas projects. |

| Issue | Summary Number | Summary Comment | Summary Response |
|---|---|---|---|
| Areas of Critical Environmental Concern | 2002-1 | Commenters questioned if the existing and newly proposed Areas of Environmental Concern (ACECs) meet the relevance and importance criteria requirements as stated in 43 Code of Federal Regulations (CFR) 1610.7-2 and the BLM Manual 1613, and whether these areas require special management to (1) protect the area and prevent irreparable damage to resources or natural systems and (2) adequately protect these areas from energy developments through the issuance of No Surface Occupancy (NSO) stipulations. In some cases, commenters suggested improvements to ACEC designations and provided detailed reasoning to support their position for modifications. Specifically, commenters requested that the BLM provide further explanation regarding designation of the Twin Creek ACEC and the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area.<br><br>Other commenters stated the BLM did not provide enough detail in the ACEC analysis to support designation, and made several specific requests that the BLM improve and/or disclose ACEC data and improve the analysis for ACECs, including (1) disclosure of completed ACEC evaluation forms, (2) an opportunity to cooperate and/or coordinate with the BLM in completing the ACEC evaluations, (3) detailed descriptions of allowable activities in ACECs, (4) correction of discrepancies in ACEC acreage, and (5) improved ACEC maps, including displaying National Historic Trail (NHT) features on ACEC maps. | The BLM analyzed a range of prescriptions for ACEC management, including allowable uses and activities in each ACEC as described in Chapters 2 and 4. The ACEC Report documents the evaluation process for existing and newly proposed ACECs. The report outlines how each proposed ACEC meets or does not meet the relevance and importance criteria. The report is available on the BLM website at: http://www.blm.gov/pgdata/etc/medialib/blm/wy/programs/planning/rmps/lander.Par.74315.File.dat/ACEC.pdf.<br><br>While the overall ACEC designations in the Proposed Resource Management Plan (RMP) and Final EIS are the same as in the Draft RMP and EIS, management of some of the ACECs has been altered to address comments. In order to better protect resource values, including greater sage-grouse, the BLM is recommending withdrawal of 306,360 acres of land in the Hudson to Atlantic City, including the Twin Creek ACEC. The BLM is no longer designating the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area which had previously encompassed the Twin Creek ACEC because the revised management approach provides adequate protection for resources. In the case of greater sage-grouse, the area will support ongoing and future research that will benefit greater sage-grouse and industry statewide.<br><br>The BLM updated the Proposed RMP and Final EIS to include additional citations to the ACEC report and other sources as appropriate to support the determinations, and made various editorial changes and provided clarifying text as needed. The BLM also reviewed existing Geographic Information System (GIS) data and mapping products for ACEC locations, and made changes where appropriate based on comments received. |

| Issue | Summary Number | Summary Comment | Summary Response |
|---|---|---|---|
| Climate Change | 2003-1 | Commenters expressed concern that although impacts from climate change are described in the document, the BLM does not provide management actions to address those impacts. Some commenters insisted the BLM incorporate more climate change planning in the RMP and EIS. Other commenters recommended addressing additional resources affected by or that could affect climate change, such as the role of BLM-authorized activities in climate change and specifically the use of uranium to generate electricity. | The BLM's primary approach to address impacts from climate change is to improve range conditions in accordance with the Wyoming Standards for Healthy Rangelands by managing livestock grazing and vegetation treatments. The BLM believes the Proposed RMP is proactive in conserving wildlife habitat so that wildlife populations can survive in a changing climate.<br><br>The authorized activities that could contribute to climate change are identified and addressed in the Proposed RMP and Final EIS. However, addressing the use of uranium to generate electricity is beyond the scope of the RMP. |
| Congressionally Designated Trails | 2004-1 | Commenters indicated general concern regarding the proposed uses and protection of Congressionally Designated Trails in the planning area. In addition, commenters stated impacts from trail management and other development, such as uranium development, were not fully assessed. Specific concerns included the limitations of surface-disturbing activities within 5 miles of a Congressionally Designated Trail, a lack of adequate justification for Congressionally Designated Trails protection, and a need for the BLM to incorporate direction contained in the 2009 Continental Divide National Scenic Trail Comprehensive Plan. Commenters provided suggested language and actions for the BLM to incorporate in its management of the Congressionally Designated Trails.<br><br>Commenters also identified a number of technical edits related to the Congressionally Designated Trails analysis, including requests to use alternative language, corrections to technical statements and/or terms, requests to define terms, clarification of language, and corrections to GIS maps depicting the Congressionally Designated Trails. | The BLM has updated the Proposed RMP and Final EIS to reflect commenter recommendations regarding uses of and protections offered to Congressionally Designated Trails, including limitations on surface-disturbing activities within 5 miles of Congressionally Designated Trails, use of alternative language, corrections to technical statements and/or terms, requests to define terms, clarification of language, and corrections to GIS maps depicting the Congressionally Designated Trails. The BLM has reviewed and incorporated the tenets of the 2009 Continental Divide National Scenic Trail Comprehensive Plan into the Proposed RMP and Final EIS. |

| Issue | Summary Number | Summary Comment | Summary Response |
|---|---|---|---|
| Cultural Resources | 2005-1 | Commenters requested the BLM include additional analysis and data regarding impacts to cultural resources. Specifically, commenters indicated the BLM should disclose general information regarding the location of cultural sites, so livestock grazing permittees and oil and gas operations would know the locations where the described restrictions will be enforced. Commenters requested that the BLM acknowledge that oil and gas development has led to beneficial impacts on cultural resources through site-specific assessments required by the BLM. Commenters suggested other topics that the BLM should consider addressing in the Proposed RMP and Final EIS, such as protecting and managing livestock grazing as a traditional use eligible for listing on the *National Register of Historic Places*, and documenting the importance of using the historic trails for historic reenactments to The Church of Jesus Christ of Latter-day Saints.<br><br>Commenters also requested clarification on the use of terms, the correction of citations, and the location of the discussions of cultural and historic properties. | The BLM will work with oil and gas companies to accommodate development plans in Designated Development Areas (DDAs) where cultural sites are present, and work with grazing permittees regarding proposed range infrastructure projects to avoid adversely impacting cultural sites.<br><br>Livestock grazing as a use is not covered under the National Historic Preservation Act, which directs federal agencies to identify, evaluate, and assess effects to historic properties that are eligible for listing on the *National Register of Historic Places*. Properties associated with livestock grazing can be found eligible for National Register listing, but livestock grazing as a use cannot be considered as a historic property.<br><br>The BLM added text to Chapter 4 recognizing knowledge can be gained from recordation and data recovery related to oil and gas development. However, this information is gathered to reduce adverse effects to cultural resources, and the overall effect from disturbance of cultural resources is still adverse rather than beneficial. The BLM also added text to Chapter 3 acknowledging the importance of the NHTs to The Church of Jesus Christ of Latter-day Saints.<br><br>The BLM reviewed the document and made edits as necessary to clarify language and correct citations. |
| Cultural Resources | 2005-2 | Commenters requested that the BLM add more information regarding oil and gas operator cooperation with the BLM and other stakeholders to reduce potential visual impacts to cultural resources. Multiple commenters indicated that the BLM has not provided justification for requiring special management or protection for regionally significant historic trails and early highways, and justification for buffer distances for cultural sites and historic trails. A commenter recommended that several management actions under Alternative B that increase protections for cultural resources be added to Alternative D. In addition, a commenter questioned how the BLM would manage the proposed Heritage Tourism and Recreation Management Corridor, and another commenter expressed concern about the extent of BLM involvement in identifying sites for consideration for National Register listing that occur on state or private land. | The BLM added text to Chapter 4 to reflect agreements where special guidelines to reduce visual impacts on cultural resources have been incorporated into field-wide operations.<br><br>Section 106 of the National Historic Preservation Act directs federal agencies to identify, evaluate, and assess effects of its undertakings on historic properties that are eligible for listing on the *National Register of Historic Places*. The BLM and State Historic Preservation Office (SHPO) have found all cultural sites, NHTs, and Regionally Significant Historic Trails and Early Highways identified in the Draft RMP and EIS eligible for nomination to the National Register. All of the NHTs and early highways have segments that are considered "contributing" to their National Register qualities and portions that are considered "non-contributing." The BLM is required to protect the eligibility of the cultural sites, NHTs, and |

| Issue | Summary Number | Summary Comment | Summary Response |
|---|---|---|---|
| | | | Regionally Significant Historic Trails and Early Highways, and has prescribed buffers to protect the important values of these resources.<br><br>The BLM determined the protections prescribed under the Proposed RMP (Alternative D) were adequate to protect cultural sites in the planning area. Many of the protections under Alternative B are provided in other management actions (e.g., Special Designations) under the Proposed RMP. Chapter 2 describes the management prescriptions in detail.<br><br>The BLM's Cultural Resources 8100 Manual provides guidance for the BLM's responsibilities for cultural resources on non-federal lands. The extent of the BLM's responsibility for identifying and protecting non-federal cultural resources is limited by the degree to which BLM decisions determine or control the location of activities on non-federal lands that could affect cultural resources (see BLM Manual Section 8140.O6D). Identification and/or mitigation of adverse effects may be required as a condition of a lease, permit, or license issued by the BLM, whether federal or non-federal lands are involved. |
| Cumulative Impacts | 2006-1 | Commenters recommended that the BLM further analyze cumulative impacts regarding multiple resources, resource uses, special designations, and socioeconomic conditions. Specifically, commenters requested a higher degree of analysis of cumulative impacts to NHTs, greater sage-grouse, vegetation communities, agriculture, and oil, gas, minerals, and timber industries. Commenters also indicated a need for different models to assess cumulative socioeconomic impacts on the public in the planning area and offered technical corrections for information included in the analysis. | Overall, the BLM determined the current cumulative impacts analysis is appropriate and adequately informs the decision-making process. The BLM revised the cumulative impacts section to update citations related to statewide air emission inventory and the Wyoming Governor's Greater Sage-Grouse Core Area Protection Executive Order 2011-5, and update information and/or provide clarifications, as appropriate. Regarding the need to address socioeconomic impacts, the BLM has adopted the Impact Analysis for Planning Model (IMPLAN) analysis for use in its planning activities; while other models are available, IMPLAN provides an appropriate tool for comparing alternatives. |

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| Editorial, Readability, and Data Issues | 2007-1 | Commenters recommended a number of editorial revisions in the Draft RMP and EIS including spelling and grammar corrections. Commenters also recommended additions and revisions to the glossary, incorporating updated guidance, adding specific terminology or clarifying language, and improving readability.<br><br>Commenters pointed to several inaccuracies and inconsistencies in numbers and data as presented in the Draft RMP and EIS and requested that the BLM ensure that tables and figures are verified by GIS datasets; develop a detailed reference list that includes all GIS layers used; correct discrepancies in acreage; and incorporate pertinent spatial datasets. In addition, a commenter requested that the BLM provide a detailed list of sources for all GIS data layers referenced in the text. | The BLM evaluated all requests regarding readability, editorial suggestions, reference citations, and suggested additions and corrections, and revised the document, as appropriate. In addition, the BLM reviewed GIS data, methods, and mapping products and revised and updated shapefiles, tables, acreage, and maps, as appropriate. GIS data cited in the RMP includes hundreds of GIS files (e.g., shapefiles, raster datasets, and geodatabase feature classes), which provide all data and map sources referenced in the EIS. Additional information about GIS calculations presented in the EIS is provided in the Administrative Record. Revisions made in the Proposed RMP and Final EIS are identified by shaded text. |
| Environmental Justice | 2008-1 | The commenter asserted that the RMP does not adequately analyze environmental justice because it fails to measure impacts to individual communities. | The BLM believes the analysis in the RMP and EIS adequately addresses environmental justice issues, including minority or low-income communities or populations as defined in Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994), and guidance provided by BLM Instructional Memorandum (IM) 2002-164 (Guidance on Environmental Justice in Planning). |
| Extension and Hard Copy Request | 2009-1 | Commenters requested that the BLM extend the comment period 45 to 90 days, to allow more time to review the Draft RMP and EIS and formulate comments. Several commenters also requested hard-copy versions of the Draft RMP and EIS. | The BLM extended the public comment period for 45 days. The BLM printed a limited number of hard-copy documents. Hard copy versions were available at public libraries throughout the planning area. |
| Fire and Fuels Management | 2010-1 | Commenters identified a number of technical edits related to fire and fuels. These edits included requests to use alternative language, corrections to technical statements and/or terms, definitions of terms, and clarification of language. In addition, commenters provided suggested changes to Management Actions Common to All Alternatives. | The BLM has updated the text of the Proposed RMP and Final EIS to reflect commenter recommendations regarding clarifying language and guidance, and to reflect commenter recommendations regarding the proposed addition to Management Actions Common to All Alternatives. |

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| Fish | 2011-1 | Commenters asserted that the RMP and EIS does not adequately analyze certain impacts to fish and fish habitat, including (1) impacts from oil and gas development to sensitive coldwater fish species, (2) buffers for intermittent and ephemeral streams, and (3) long-term and short-term impacts to fish longevity. Commenters recommended increasing protections for fish by designating streams as unique fisheries and increasing stream buffer protections for perennial streams. Commenters also made various data requests related to fish management, including adding a map and correcting errors in a map. | The BLM revised the Fish sections of the Proposed RMP and Final EIS based on commenter input where appropriate. Details pertaining to sensitive coldwater fish are presented in the Special Status Species section, and are not discussed in the Fish section. Discussions regarding buffers for fish-bearing streams are provided in the document where appropriate and in compliance with the BLM Wyoming policy. Chapter 4 discusses type and duration of impacts on fish longevity; however, these timeframes are used primarily as reference periods in which to conduct the analysis and do not necessarily apply to analysis of individual species.<br><br>The BLM reviewed GIS data and mapping products, and revised and/or updated GIS shapefiles, text, acreage, and maps, as appropriate, in the Proposed RMP and Final EIS. |
| Greater Sage-Grouse | 2012-1 | Commenters expressed a varying range of opinions over whether greater sage-grouse protections are insufficient, overly restrictive, or are otherwise inconsistent with various regulations and guidance documents for greater sage-grouse, including the BLM State Director's IM No. WY-2010-012, the Wyoming Governor's Greater Sage-Grouse Core Area Protection Executive Order 2011-5, and/or the 2011 National Technical Team (NTT) Report on National Greater Sage-Grouse Conservation Measures. Commenters requested additional scientific reasoning for instances in which the BLM decisions were regarded as inconsistent with existing regulations and guidance. Specific issues of concern included (1) the expansion of timing limitations and night-time stipulations on surface-disturbing activities, (2) the authorization of new transmission lines, (3) the inclusion of leks with undetermined occupancy in the BLM analyses, and (4) appropriate criteria and methodologies for determining habitat, Core Area, buffer distances, and disturbance caps.<br><br>Several commenters noted oil and gas development on private lands are subject to restrictions in the Core Area strategy. Commenters also noted that the Wyoming Governor's Greater Sage-Grouse Core Area Protection Executive Orders 2008-4 and 2010-4 have been replaced by Executive Order 2011-5, and | The BLM updated the alternatives, analyses, and other applicable sections related to greater sage-grouse to reflect changes in management to be consistent with National and Wyoming policies and guidance on the management of greater sage-grouse and their habitat. The Proposed RMP and Final EIS maintains overall consistency with the Core Area strategy, outlined in the Wyoming Governor's Greater Sage-Grouse Core Area Protection Executive Order 2011-5, and includes additional conservation measures recommended in the NTT Report. The BLM supplemented Appendix H (p. 1521) with additional BMPs and Required Design Features for greater sage-grouse protection that were identified in the NTT Report. While the BLM did not incorporate all conservation measures recommended in the NTT Report into the Proposed RMP, the BLM believes all applicable conservation measures were considered in one or more of the alternatives analyzed. The NTT Conformance Table, available on the Lander RMP website (http://www.blm.gov/wy/st/en/programs/Planning/rmps/lander.html), provides additional information about how the BLM incorporated conservation measures into the Proposed RMP and Final EIS.<br><br>The Proposed RMP and Final EIS includes a range of reasonable alternatives for greater sage-grouse management |

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| | | that any references or associated language should be updated to reflect the most recent Executive Order.<br><br>Commenters requested that Alternative D avoidance and exclusion maps based on greater sage-grouse habitat types be updated to remain consistent with the provisions in the Wyoming Governor's Greater Sage-Grouse Core Area Protection Executive Order 2011-5. | and the BLM revised the document to include additional and updated information on greater sage-grouse Core Area management, including changes to management actions and an updated definition of Core Area in the Glossary. Additionally, the BLM verified the analysis and incorporated the latest greater sage-grouse Core Area data from the Wyoming Game and Fish Department (WGFD) as of the end of the public comment period.<br><br>The BLM added language in Chapter 4 to clarify that private lands are not subject to BLM Core Area or non-Core Area stipulations; however, oil and gas activities on private land would be subject to Core Area stipulations promulgated by the Wyoming Oil and Gas Conservation Commission and the Wyoming DEQ.<br><br>In addition, the BLM reviewed the Alternative D corridor maps in relation to the Wyoming Governor's Greater Sage-Grouse Core Area Protection Executive Order 2011-5 and identified several appropriate changes, although the BLM did not make all the changes commenters suggested. |
| Greater Sage-Grouse | 2012-2 | Commenters indicated that the analysis of greater sage-grouse could be improved by including more descriptive explanations, additional rationale and analysis criteria, clarification of terminology, and scientific references. Specifically, commenters questioned or raised concerns pertaining to (1) greater sage-grouse impacts on and from livestock grazing management, particularly regarding the impacts of water development and fencing on nesting cover, (2) impacts to greater sage-grouse from oil and gas development, (3) spatial inconsistencies between Core Area depicted in the Wyoming Governor's Greater Sage-Grouse Core Area Protection Executive Order 2011-5 and those delineated by the BLM, (4) inadequate historical context and data on greater sage-grouse populations in the region, (5) use of the Density Disturbance Calculation Tool, and (6) in some cases, commenters cited specific research the BLM could reference to inform agency decisions regarding greater sage-grouse impacts on and from other resources. | The BLM revised the analyses in applicable sections on greater sage-grouse in the Proposed RMP and Final EIS, including clarification of impacts associated with or from livestock grazing and oil and gas development, consistency with the Wyoming Governor's Greater Sage-Grouse Core Area Protection Executive Order 2011-5, and supplemental text and supporting scientific references, as appropriate. |

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| Greater Sage-Grouse | 2012-3 | Commenters offered specific recommendations and critiques, and requested additional clarification for a variety of greater sage-grouse management provisions in the RMP and EIS, including prescriptions related to buffer size, habitat connectivity, disturbance caps, fencing, water development, seasonal timing limitations, noise, noxious weeds, and ravens. Commenters also suggested revising the biological resource goals to clarify the BLM's intent to maintain and preserve connections between greater sage-grouse habitat while providing for multiple-use management. A number of commenters requested that the BLM clarify restrictions on wind-energy development, particularly in Core Area. | The BLM revised management actions and applicable sections on greater sage-grouse in the Proposed RMP and Final EIS. Specifically, the BLM updated text to ensure consistency with the Wyoming Governor's Greater Sage-Grouse Core Area Protection Executive Order 2011-5, include additional scientific citations, clarify restrictions associated with wind-energy development in Core Area, and require anti-perching and predation deterrents, and made other revisions, as appropriate. |
| Health and Safety | 2013-1 | Commenters questioned the bonding provision for surface-disturbing activity in the RMP and EIS, with some commenters suggesting expanding the requirements to better protect public health and safety and making the bonding provision cover ecological function. Other commenters opposed the bonding provision, suggesting it was adequately covered in the BLM policy and federal regulations and therefore not necessary to address in the RMP and EIS. | The Lander Field Office does not have the authority to determine how operators are bonded. BLM policy is to bond as accurately as possible to ensure full reclamation from mining activities to the desired future condition. The BLM guidance supports addressing bond requirements in a planning document. |
| Invasive Species | 2014-1 | Commenters expressed concerns that the overall approach to invasive species management is insufficient to prevent the spread of invasive species, and is onerous to operators who must comply with measures to prevent invasive species spread. Commenters proposed changes to reclamation requirements regarding invasive species including (1) reconsidering the timeframe required to successfully establish shrubs and forbs after reclamation, (2) reducing the standard for percent allowable invasive nonnative species in non-DDAs, and (3) reconsidering the objectives for final reclamation in non-DDAs. Commenters also suggested additional actions to reduce invasive species spread, such as implementing a plan to reduce cheatgrass invasion.<br><br>Commenters also suggested revisions to clarify and correct inconsistencies and purported inaccuracies in the text related to livestock grazing and spread of invasive species, lists of noxious weeds, weed transmittal, and interim reclamation standards. | After further review, the BLM believes the overall approach to invasive species management in the Proposed RMP and Final EIS is adequate. Reclamation standards are designed to prevent the spread of invasive species and vary between DDAs and non-DDAs. Reclamation objectives in non-DDAs must meet a higher standard than in DDAs because non-DDAs include identified resources such as greater sage-grouse Core Area or other important wildlife and plant species. The basis for reclamation standards in non-DDA areas is restoration of habitat similar to that prior to disturbance. Reclamation standards do not establish timelines for considering when reclamation is successful.<br><br>The BLM has updated the Proposed RMP and Final EIS to address inconsistencies and provide additional clarity as needed. Specifically, the BLM revised text to correct an inconsistency related to interim reclamation standards in Chapter 4. |

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| Lands and Realty | 2015-1 | Commenters requested land tenure adjustments for multiple reasons, including public shooting ranges, recreation opportunities, wildlife protection, and livestock grazing. | The BLM revised Appendix R (p. 1623) to include new parcels identified for land tenure adjustment, correct errors in legal descriptions, and add parcels that were inadvertently omitted in the Draft RMP and EIS. Parcels added would provide for a public shooting range, and consolidate isolated parcels used for livestock grazing. The BLM is currently working with the State of Wyoming on an agreement to exchange lands for recreation and wildlife values. |
| Laws, Regulations, Guidance, Process | 2016-1 | Commenters stated the Draft RMP and EIS did not contain sufficient historical or baseline data for assessing impacts, provided an inadequate analysis of impacts, and that the BLM did not follow relevant FLMPA and NEPA processes or comply with BLM policy and Council on Environmental Quality guidance and other relevant laws and land use plans. Commenters asserted the BLM did not fully involve interested parties, stakeholders, and/or cooperators during development of the RMP and EIS or its alternatives, or share data with interested parties. | The BLM has reviewed and ensured compliance with FLPMA, NEPA, and other relevant laws, policy, and land use plans. As revised, the BLM believes the Proposed RMP and Final EIS adequately analyzes impacts from proposed management and includes sufficient historical or baseline data for assessing impacts. The BLM has met its collaboration/cooperating agency requirements in accordance with FLPMA and public involvement requirements under NEPA. The BLM has provided non-confidential data to entities that have made such requests. |
| Leasable Minerals – Geothermal | 2017-1 | Commenters expressed general concerns regarding potential impacts from geothermal development on sensitive resources. Specifically, commenters stated that the buffer restricting geothermal development near the National Landscape Conservation System trail corridor is not large enough to protect the values of the corridor and is not consistent with management of the proposed special recreation areas, ACECs, and trail management areas that would be established along the National Landscape Conservation System corridor.<br><br>Several commenters referenced new data showing geothermal energy potential in the Dubois area, and requested the BLM review and incorporate this new data into the Proposed RMP and Final EIS. In addition, commenters requested that the BLM more accurately describe the history of geothermal leasing in the planning area, including the fact that the BLM did not analyze geothermal leasing in the 1987 RMP. | The National Landscape Conservation System trail corridor is managed with an NSO stipulation and beyond that is subject to Visual Resource Management (VRM) limitations. The BLM believes this management provides sufficient protection of values in the corridor.<br><br>The BLM has considered the new data regarding geothermal energy potential in the Dubois area. However, given the important wildlife values that are incompatible with geothermal development, the Dubois area is closed to geothermal leasing. Alternative A recognizes that the 1987 RMP did not analyze geothermal resources. |

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| Leasable Minerals – Oil and Gas | 2018-1 | Commenters expressed a number of concerns related to DDA establishment, expansion, and development constraints. In this regard, commenters requested detailed information explaining how DDA boundaries are determined, and clarification on the applicability of various development stipulations occurring therein. Commenters specifically recommended that the BLM (1) provide a mechanism that would allow the future expansion of DDAs without requiring an RMP amendment, (2) limit the application of standard stipulations and/or COAs for operations in DDAs, particularly if they would compromise valid existing lease rights or curtail mineral production, (3) remove seasonal protections in DDAs, and (4) reconfigure DDA boundaries to avoid overlap with the Ninemile Draw Important Bird Area. | The BLM has updated the Proposed RMP and Final EIS to reflect changes, including application of DDA stipulations, conducting year-round operations in DDAs, and waiver procedures for seasonal protections for operations in DDAs. The BLM has determined that an expansion of the DDAs would require an RMP amendment. |
| Leasable Minerals – Oil and Gas | 2018-2 | Given the minimal, short-term surface disturbances caused by geophysical exploration, commenters asserted that these activities should not be limited to the same extent and in the same areas where oil and gas development is prohibited. Furthermore, commenters argued that removing limitations on the collection of geophysical data would reduce future disturbances by reducing the number of wells required to locate and produce the targeted resource. Commenters also questioned if the BLM has legal authority to encourage the sharing of seismic data between operators. | The BLM has determined that, at a minimum, geophysical exploration is a disruptive activity. The BLM does not agree that a blanket closure is inappropriate since an exception may be obtained. The BLM can encourage the sharing of data that would reduce the demand for additional surveys and associated impacts to other resources. |
| Leasable Minerals – Oil and Gas | 2018-3 | Commenters expressed general concern that lease stipulations and mitigation measures for mineral development in the RMP and EIS are more restrictive than necessary based on FLPMA and Energy Policy Act of 2005 mandates. Specifically, commenters requested more detailed descriptions and reasoning regarding (1) the amount of acres closed to mineral development and subject to NSO and other stipulations, (2) how oil and gas development in the planning area will be managed for and affected by wildlife stipulations proposed in the alternatives, (3) economic impacts associated with closures, major constraints, and seasonal prohibitions placed on mineral leasing in the planning area, and (4) assurances that proposed stipulations will not interfere with valid existing lease rights. Commenters made specific requests for the BLM to revise management of oil and gas, such as allowing basic maintenance and emergency actions for oil and gas operations year-round despite proposed seasonal closures and timing limitations. Other commenters | The BLM has reviewed and updated the Proposed RMP and Final EIS to ensure consistency with applicable state and federal laws and policy. Specifically, the BLM revised text regarding the validity of existing lease rights, included the most current BMPs, used the Density Disturbance Calculation Tool for surface-disturbance evaluations in greater sage-grouse Core Area, more clearly described where NSO stipulations apply, and modified designated corridors for pipeline routes. The Proposed RMP and Final EIS incorporates the Core Area strategy, which includes surface-disturbance caps and limits on the number of energy developments. A substantial amount of Core Area is NSO for the protection of a variety of resources, including other wildlife and trails. The BLM reviewed the economic analysis, and believes the Proposed RMP and Final EIS adequately analyzes the impacts to the local and regional economy from oil and gas management. |

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| | | favored the implementation of additional closures, and/or recommended additional BMPs and mitigation measures for oil and gas development.<br><br>Commenters also requested the BLM give further consideration and incorporate additional analysis associated with emergent technologies including Enhanced Oil Recovery (EOR), horizontal well drilling, and $CO_2$ sequestration. | The BLM has considered emergent technologies in the Proposed RMP and Final EIS and made appropriate revisions, including modifying designated corridors to provide more pipeline routes. |
| Leasable Minerals – Oil and Gas | 2018-4 | Commenters expressed opposition to the Beaver Rim Master Leasing Plan (MLP) because it would be redundant in light of the existing alternative analysis and associated resource protections presented in the RMP and EIS. Therefore, commenters requested that more detailed reasoning and decision criteria be provided to determine whether the application of an MLP is warranted. One commenter in favor of the Beaver Rim MLP suggested that additional restrictions be placed on development near known occurrences of desert yellowhead. | IM 2010-117 authorized the BLM to consider proposals for and identify areas suitable for management as an MLP. The BLM received five nominations for MLPs, although only the Beaver Rim area was carried forward for detailed analysis. Chapter 2 includes the identification and consideration of all five proposed MLP areas, and Chapter 3 provides additional details regarding the Beaver Rim MLP. No additional analysis on MLPs is anticipated until a new MLP area is proposed. The BLM already has management in place that addresses the protection of desert yellowhead. |
| Leasable Minerals – Oil and Gas | 2018-5 | A commenter requested that the BLM require the disclosure of compounds in produced water and their concentrations to better assess potential impacts to nearby water resources. The commenter requested that the BLM establish additional provisions regulating the disposal of produced water. | The BLM does not have authority to establish provisions that regulate the disposal of produced water because the State of Wyoming regulates these actions.<br><br>The BLM analyzed and included text in the Proposed RMP and Final EIS regarding potential for impacts to BLM-administered lands associated with produced water, with reference to State of Wyoming pollutant levels. |
| Leasable Minerals – Oil and Gas | 2018-6 | Commenters stated that the analysis of the Reasonable Foreseeable Development (RFD) underestimates the potential for the discovery of minerals and oil and gas reserves, noting the large number of potential well sites identified in recent development proposals. Furthermore, commenters stated that the RMP and EIS does not adequately analyze development potential associated with horizontal drilling and the associated surface disturbance impacts of fewer numbers of larger well pads. Many commenters requested that the BLM include additional clarification that the RFD does not represent a planning decision or development "cap". | The BLM believes the RFD provides an appropriate estimate of future development for purposes of comparing alternatives, given the data available and the uncertainty in future oil and gas development. The BLM revised the Proposed RMP and Final EIS to further clarify that the RFD is an estimate of mineral development potential and is in no way a limitation on future oil and gas development in the planning area. The BLM uses the RFD as a tool to compare impacts across the alternatives. Site-specific impacts, including surface disturbance from horizontal drilling, or impacts on air resources are best analyzed project by project. |

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| Leasable Minerals – Oil Shale | 2019-1 | Commenters stated that the RMP and EIS failed to accurately account for the potential for development of oil shale formations in the planning area. Commenters argued that the BLM's decision to restrict future oil shale development to currently producing areas contradicts the agency's multiple-use and sustained yield mandates. One commenter suggested that alternative language be used to explain the BLM standard for processing oil shale applications. | The BLM modified text in the Proposed RMP and Final EIS to clarify that "oil shale" development in the context of the RMP refers to unconventional oil shale-tar sand development, and not to conventional oil and gas operations in shale formations. The BLM believes the overall approach to oil shale-tar sands in the RMP and EIS is adequate and is consistent with the BLM's multiple-use mission.<br><br>The BLM revised the text related to processing applications. The statement was meant to indicate that the lease could not be approved without a land use amendment. An application could be denied as inconsistent with the Proposed RMP and Final EIS, because oil shale-tar sands were not analyzed and leases were not authorized. |
| Leasable Minerals – Other Solid Leasable Minerals | 2020-1 | Commenters asserted that the BLM failed to accurately depict phosphate development potential in the planning area, and that management was too restrictive in areas with high phosphate development potential. Specifically, commenters expressed concern that (1) discussion of phosphate potential based on current market conditions is not accurate, (2) phosphate resources in the planning area have not been fully identified, (3) the BLM has not acknowledged that technology has improved, providing access to phosphate resources that were previously considered inaccessible, including underground mining methods, and (4) the discussion of adverse impacts to phosphate development are not accurate.<br><br>Commenters also noted various inconsistencies in the RMP and EIS, including surface disturbance stipulations in greater sage-grouse Core Area. | The discussion of phosphate potential and market conditions in the RMP and EIS relies on the Final Mineral Occurrence and Development Potential Report for the Lander Field Office, which used the most current information at the time it was written. Commodity prices for all minerals, including phosphate, are in constant flux; therefore, the discussion of prices and market conditions provides a snapshot of the time this section was written. However, in considering phosphate and other mineral development, the BLM takes a long-term view using the most current data available. The BLM modified the phosphate sections of the Proposed RMP and Final EIS to indicate that both underground and surface mining have been evaluated. The BLM reviewed the phosphate section, including the analysis, and revised it for inaccuracies or inconsistencies. |

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| Livestock Grazing Management | 2021-1 | Commenters expressed concern about the Animal Unit Month (AUM) reductions proposed in the RMP and EIS, and questioned the scientific methods the BLM used to determine the location and amount of AUM reductions to minimize conflicts with other resources. Commenters requested additional information on current livestock grazing AUMs by allotment and preference and suspended AUMs. | The proposed RMP does not reduce or increase AUMs, but identifies the potential based on current rangeland health and the proposed alternative. The BLM discloses projected AUMs for each alternative in Chapter 2 and provides allotment categorization in Appendix K (p. 1547). In general, AUM adjustments are made through subsequent implementation-level analyses and decisions based on monitoring data and on-the-ground conditions. The BLM revised the AUM numbers/acreage where appropriate based on comments received. Additionally, the BLM added details that clarify AUMs by allotment and livestock type (i.e., cattle or sheep), provided additional references where appropriate, and inserted text that details why areas have not historically been available to grazing. The RMP only applies to federal lands in the Lander Field Office planning area. Private and state land AUMs and suspended AUMs are not part of the affected environment; therefore, it is inappropriate to include this information in the document. |
| Livestock Grazing Management | 2021-2 | Commenters sought clarification on the use of Comprehensive Grazing Strategies, including their definition, purpose, and requirements. Additionally, commenters requested clarification on the Comprehensive Grazing Strategy process, scale, criteria for development, and if a Comprehensive Grazing Strategy would replace the need for an Allotment Management Plan. | First, and foremost, Comprehensive Grazing Strategies are intended to maintain, and/or make substantial progress toward, fulfillment of the Wyoming Standards for Healthy Rangelands. The BLM has modified the discussion regarding Comprehensive Grazing Strategies in Appendix K (p. 1547) to clarify its definition and use. The revised discussion addresses the concerns regarding grazing intensity and season of use. The BLM revised the document to clarify that Comprehensive Grazing Strategies do not need to be a formalized management plan and do not replace the need for an Allotment Management Plan. |

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| Livestock Grazing Management | 2021-3 | Commenters stated there was a lack of adequate disclosure of impacts and/or consequences associated with livestock grazing in the planning area and suggested revisions to the BLM's approach to livestock grazing management. Specifically, commenters requested more discussion on the economic impacts as a result of proposed livestock grazing management changes, impacts of livestock grazing to/from wildlife species (including special status species), and policies and specific management actions or changes in current management.<br><br>Commenters also requested additional details pertinent to the livestock grazing management analysis, including (1) clarification of terminology, (2) supporting scientific citations for technical statements, (3) details on determination of utilization levels for allotments, (4) specific requirements and limitations placed on livestock grazing practices for the protection of other resources, and (5) clarification indicating if livestock management activities are or are not considered surface-disturbing activities. | The BLM developed and analyzed alternatives in the Proposed RMP and Final EIS using the best available information in compliance with federal laws, guidelines, and policies. The BLM used GIS data that analyzed fence placement, distance from water, precipitation, vegetation, and production, as well as competing resources, such as wild horses and wildlife, to estimate likely future impacts. This approach allowed the BLM to calculate input to the IMPLAN model so that the economic consequences of the alternatives could be compared. The BLM has revised Appendix K (p. 1547) to address how the agency addresses livestock grazing management and conflicts with other resources.<br><br>In addition, the BLM reviewed and revised the Proposed RMP and Final EIS as necessary to include clarifying text/terminology, supporting scientific citations, and correct acreage and AUM figures, and to reflect the fact that the BLM does not consider livestock grazing or other herbivory to be a surface-disturbing activity. The Proposed RMP and Final EIS does not set utilization levels for livestock grazing, because those levels are established in site-specific allotment management plans. |
| Livestock Grazing Management | 2021-4 | Commenters requested additional information in the RMP regarding how the BLM considers range improvements, specifically regarding placement, implementation, and type of water sources; fence lines; and gate operations. | The BLM considers range improvements as needed to implement a Comprehensive Grazing Management Strategy. The agency will evaluate impacts resulting from any proposed range improvement in site-specific NEPA documents. |
| Livestock Grazing Management | 2021-5 | Commenters expressed concern about how the BLM is considering rangeland health, including the process for conducting and considering rangeland health assessments, and addressing allotments that failed to meet the Standards for Healthy Rangelands. Specifically, commenters requested additional details about the methods and procedures the BLM used to complete rangeland and livestock grazing allotment assessments, and how impacts of livestock grazing on other resources were included in the assessments. | The BLM is required to meet the Standards for Healthy Rangelands and conform to the Guidelines for Livestock Grazing Management in accordance with 43 CFR 4180.2. In areas that fail to meet Standards for Healthy Rangelands, the BLM will use the Guidelines to establish appropriate actions. The BLM will work with the permittees, state and local governments, and the interested public to address those standards on a site-specific basis analyzed under NEPA. The BLM has provided clarification in the Proposed RMP and Final EIS that changes to grazing management are implemented when rangelands are not meeting standards due to current livestock grazing, and provided details on the process for completing standards assessments. |

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| Locatable Minerals | 2022-1 | Commenters requested the BLM provide greater protections to resource values, such as greater sage-grouse habitat and ACECs, from locatable mineral activity, including increasing the acreage of withdrawals from mineral entry in an effort to further protect environmental, scenic, and cultural values in these areas.<br><br>Other commenters asserted the BLM did not recognize the value or volume of uranium resources in the planning area, and requested the BLM include additional information on the mineral's importance to the region and nation in providing clean and abundant energy and high-paying jobs.<br><br>Commenters pointed out factual inaccuracies in the RMP and EIS about certain aspects of uranium operations in the planning area, such as the potential for surface and underground mining of uranium, in addition to in situ recovery. Commenters also requested updated and additional data and information in the RMP and EIS related to research on mineral potential and the location and impacts to individual mining claims. | The BLM updated management in the Minerals sections in the Proposed RMP and Final EIS identifying additional areas to pursue for mineral withdrawal, including along the Lander Front. In other areas, the Core Area strategy provides protection for greater sage-grouse and other resource values from locatable mineral activity. In addition, FLPMA Section 302(b) requires the BLM to prevent unnecessary or undue degradation of public lands. The BLM revised the Proposed RMP and Final EIS to clarify the process by which ACECs may be withdrawn on a case-by-case basis and provide the rational for lands considered for withdrawal in greater sage-grouse Core Area, and made other revisions, as appropriate.<br><br>The BLM believes the discussion of uranium in the RMP and EIS accurately depicts uranium's importance and benefits in the planning area, and the magnitude of deposits.<br><br>The BLM updated the Minerals sections in the Proposed RMP and Final EIS to reflect that, in addition to in situ recovery, open-pit and underground mining could be used to extract uranium in the planning area. The operational status of the Big Eagle Mine was updated as open. Regarding updating and using additional data, the BLM uses and incorporates the most current data available on mineral potential. |
| Recreation | 2023-1 | Commenters generally requested the BLM provide more opportunities for recreation activities and protect popular recreation areas from incompatible uses. Commenters suggested withdrawing certain recreation areas from mineral entry to preserve recreation opportunities, and designating other areas as Special Recreation Management Areas (SRMAs) or Extensive Recreation Management Areas (ERMAs) to manage for specific recreation opportunities.<br><br>Commenters suggested other revisions and considerations to clarify the analysis of impacts and justify management prescriptions that would limit incompatible resource uses. For example, a commenter requested the BLM address how reduction in AUMS for some ranches could result in the loss of hunting and fishing opportunities on private property. | The BLM has identified areas in the Proposed RMP and Final EIS that will be withdrawn from mineral entry or designated as SRMAs or ERMAs. Where appropriate, the BLM revised the text in the Proposed RMP and Final EIS to clarify impacts and incorporate additional analysis. The BLM has revised the document to include analysis of loss of hunting and fishing on private properties, and updated the Proposed RMP and Final EIS to reflect potential impacts of the loss of AUMs to fishing and hunting on private ranches. |

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| Renewable Energy | 2024-1 | Commenters indicated that certain areas should be designated as exclusion and avoidance areas for wind-energy development to protect wildlife and maintain management consistency with other designated areas; other commenters requested that additional areas be opened to wind-energy development. Commenters requested a more defined management approach (as opposed to case-by-case management) and suggested larger buffers and BMPs to protect visual, wildlife, and other values. Multiple commenters requested that the BLM remove language regarding surface-disturbing caps on renewable and conventional energy development or add clarifying language that explains where and how surface-disturbing caps are applied. | The BLM has updated the Proposed RMP and Final EIS to reflect changes in areas that are designated as wind-energy development exclusion and avoidance areas, and limitations on wind-energy development in greater sage-grouse Core Area. The surface-disturbance caps referenced in Chapter 2 are for greater sage-grouse Core Area protection. The disturbance cap applies to all surface-disturbing activities in Core Area, including conventional energy development, and is consistent with the Governor's Executive Order for Core Area Protection. |
| Rights-of-Way and Corridors | 2025-1 | Several commenters expressed concern about management of communication sites, including expiration of leases (specifically communications facilities on Whiskey Mountain) and restrictions on placement of new communication sites. | The BLM is encouraging investments in modern communications infrastructure (e.g., such as fiber optics) while discouraging unplanned scattering of older technology (e.g., transmission towers) in locations that could result in adverse impacts. Applications for future sites in existing communication sites will have facilitated review, while applications for communication sites outside of approved or existing sites will require standard review under NEPA. The BLM updated Chapter 3 to incorporate additional information provided by commenters related to existing communication sites on Whiskey Peak, specifically identifying the various services provided by the sites. |
| Rights-of-Way and Corridors | 2025-2 | Commenters suggested revising the length and width of ROW corridors, consolidating corridors, and creating new corridors to accommodate additional or fewer pipelines, transmission lines, and other linear features. Connectivity between corridors already designated in other field office planning areas and corridors proposed in the planning area was a concern to commenters.<br><br>Commenters also recommended map and data revisions to correct inaccuracies or inconsistencies, including where exclusion and avoidance areas overlap ROW corridors. | The BLM revised the ROW management and designated corridors in the Proposed RMP and Final EIS in applicable sections, including increasing capacity and connecting corridors where applicable. Some of the corridors identified by other field offices do not consider resource conflicts in the Lander Field Office planning area, such as the limited capacity of the Beef Gap area or the mining and U.S. Department of Energy activities in the Gas Hills. Coordination between field offices cannot always resolve complicated conflicts that might not be apparent at the time of the initial field office planning efforts. The BLM has incorporated changes in the Proposed RMP and Final EIS to adopt designated corridors from other field offices where possible.<br><br>In addition, the BLM updated the maps to address commenters' concerns as appropriate. including revising ROW exclusion |

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| | | | and avoidance areas and designated corridors. The maps are for illustration purposes only – the management actions in the RMP are the decision. |
| Rights-of-Way and Corridors | 2025-3 | Commenters questioned the overall adequacy of the analysis in the ROW and Corridors section and requested additional rationale to support the proposed exclusion and avoidance areas under the Preferred Alternative. Some questioned if the ROWs and corridors were consistent with the Wyoming Governor's Greater Sage-Grouse Core Area Protection Executive Order 2011-5. Commenters also suggested clarifying language and ways to improve the analysis, such as more discussion of management prescriptions for overhead transmission facilities, a more detailed discussion of reclamation of public land disturbance from an ROW permit, and adding definitions for "major" and "minor" ROW actions. | The BLM modified exclusion areas and avoidance areas and reviewed the RMP to ensure the document provided adequate analysis and justification for the areas. ROWs and corridors designated in the Proposed RMP and Final EIS are consistent with the Wyoming Governor's Greater Sage-Grouse Core Area Protection Executive Order 2011-5.<br><br>The BLM identifies corridors in the Proposed RMP and Final EIS, while specific management prescriptions related to transmission lines, such as continued access to the lines and emergency maintenance activities, are part of the implementation process. Reclamation of all BLM-approved disturbances is addressed in the Soil sections, Appendix D (p. 1477), andAppendix H (p. 1521); definitions of major and minor ROWs are provided in the Glossary; and current BLM policy will be incorporated in the permit during the application process for renewable energy projects. |
| Riparian-Wetland | 2026-1 | Commenters stated that the analysis did not fully describe or consider the importance and existing conditions of riparian-wetlands in the planning area. Specifically commenters asserted the BLM did not propose limitations or requirements, or provide clear objectives for management of these resources beyond the proper functioning condition. Commenters requested additional discussion on the impacts to riparian-wetlands resulting from livestock grazing activities, range improvements, and infrastructure developments.<br><br>Commenters also questioned aspects of the BLM's approach to riparian-wetland protection, including setbacks, mitigation, and monitoring, and whether they were in compliance with Executive Order 11990. Commenters suggested applying NSO stipulations around high-value riparian-wetlands as another method for protecting these highly productive areas. | The BLM reviewed all sections pertinent to riparian-wetlands management and determined that the stated goals and management in the Proposed RMP and Final EIS are appropriate.<br><br>The BLM revised the text in the Proposed RMP and Final EIS, as appropriate, to provide technical corrections, additional text, and clarifications as needed. Specifically, the BLM added language pertaining to management of the proper functioning condition and evaluation of season-long grazing practices on riparian-wetlands. While the BLM agrees that additional stipulations, such as NSO, would provide a higher level of protection for riparian-wetland areas, the agency believes it more appropriate to consider such stipulations on a site-specific basis. |

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| Salable Minerals | 2027-1 | Commenters questioned the BLM's closure of areas to mineral material disposal and the analysis that supported the closures. Commenters were particularly concerned about access to mineral material sites in the western portion of the planning area to maintain local roads. Commenters requested that the BLM reevaluate potential resource conflicts and acknowledge that environmental impacts associated with materials disposal sites can be successfully mitigated. | The BLM has determined that the Proposed RMP and Final EIS adequately addresses the commenters' concerns regarding potential resource conflicts and materials disposal site mitigation, as currently written.<br><br>Regarding closing portions of the western part of the planning area to mineral material disposal, the BLM does not believe this would adversely impact local road maintenance, because private sources appear able to meet the demand. However, closure of the South Pass area would not apply to the free use of mineral materials for the purposes of constructing and maintaining federally funded highways, as described in the BLM and Federal Highway Administration interagency agreement. In addition, the BLM has revised the discussion of management of the Dubois area to reflect that existing mineral material areas can continue to be used. |
| Socioeconomic | 2028-1 | Commenters questioned the adequacy of the analysis of social and economic impacts, and expressed concern about the impact of BLM management on local and regional economies. Commenters asserted the BLM did not adequately consider sources of revenue based on visitation, impacts to the local economy from withdrawing lands from mineral entry, impacts to the local economy from restrictions on oil and gas development, economic impacts from trends in the livestock industry, and economic impacts of new VRM I and II classifications. Other commenters suggested more discussion on topics such as the value of recreation to the Lander area economy, impacts of heritage tourism on the economy, and economic impacts of greater sage-grouse restrictions on oil and gas development.<br><br>Other commenters addressed how pacing development was not the responsibility of the BLM, while others thought the provision should be expanded to include impacts on natural resources. Commenters expressed concern that an Economic Strategies Workshop was never conducted as required in the BLM's Land Use Planning Handbook (H-1601-1)<br><br>Commenters recommended including the Social and Economic Monitoring Plan developed by Dr. Robert Winthrop in the RMP and EIS. Commenters recommended that the BLM | The BLM has determined that the economic analysis adequately addresses commenters' requests regarding further analysis of sources of revenue based on visitation, impacts to the local economy from withdrawing lands from mineral entry, impacts to the local economy from restrictions on oil and gas development, economic impacts from trends in the livestock industry, economic impacts of new VRM I and II classifications, and economic contribution of ranching, as currently written.<br><br>It is entirely within the BLM's area of responsibility to ensure that authorized activities consider socioeconomic impacts, and the management would not limit operators' ability to ensure maximum ultimate recovery, nor would it inhibit their ability to respond to market conditions. Impacts on natural resources will be addressed on a site-specific basis as individual projects are developed.<br><br>The BLM held an Economic Strategies Workshop in 2007 and has solicited input from Cooperating Agencies and members of the public through various forums throughout the revision process, thereby meeting the objectives in H-1601-1.<br><br>The BLM will consider using the plan developed by Dr. Robert Winthrop in developing the indicators during implementation. |

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| | | identify specific user groups (e.g., mineral extraction industries, renewable energy users, recreation users, including locals and visitors, environmental education organizations, and grazing users) and address conflicts that occur between groups. | The BLM has determined that the Proposed RMP and Final EIS as written adequately addresses the comments. Specific user groups and conflicts among users are fully described in the applicable sections of the RMP and EIS. |
| Socioeconomic | 2028-2 | Commenters stated that the socioeconomic analysis, and the IMPLAN model in particular, fail to provide an adequate picture of the local economy. Specifically, commenters stated the IMPLAN model did not adequately address the value to the local economy of ranching, recreation, local businesses such as National Outdoor Leadership School, and activities on public lands. Commenters suggested the Regional Economics Model, Inc., as an alternative to IMPLAN, and suggested additional data and analysis topics for the BLM to consider, including local recreation, statistics for surrounding communities, tax revenues at the state level, and economic impacts of air quality restrictions. | The BLM updated Chapter 3 to include additional information about the value to the local economy of local industry and businesses such as National Outdoor Leadership School. The BLM believes that the IMPLAN analysis is more suitable for the purposes of the RMP revision than the Regional Economics Model, Inc., and that it adequately analyzes local recreation, statistics for surrounding communities, tax revenues at the state level, and economic impacts of air quality restrictions. |
| Soil | 2029-1 | Commenters expressed a variety of opinions about whether management of soils in the RMP and EIS provided adequate protection or was overly restrictive, to the detriment of other resource uses. Commenters suggested ways the BLM could improve soil management by clarifying certain management actions (e.g., management of Limited Reclamation Potential [LRP] soils) and incorporating new scientific data and literature. Some commenters recommended the BLM place additional conditions on surface-disturbing activities, such as requiring the completion of a watershed protection plan and requiring further study and mitigation measures prior to allowing surface disturbances. Other commenters requested the BLM reduce the conditions on surface-disturbing activities.<br><br>Commenters suggested that the analysis of soils in the RMP and EIS could be improved by including additional rationale and analysis criteria and a more quantitative analysis of soil erosion in the planning area, including a comparison of sediment contributions from natural and human sources. Commenters recommended that impacts to soils in the planning area from certain resources and activities be reassessed using these and other suggested methods. | The BLM has updated the Proposed RMP and Final EIS to clarify the agency's approach to soil management regarding analysis of LRP soils, surface discharge of produced water, natural causes of soil and water quality degradation, and impacts of fire. The BLM believes that limitations on surface-disturbing activities to protect soil resources are adequate. While applying further study or mitigation measures prior to allowing surface disturbance might provide beneficial protection to soil resources, this determination is more appropriately made on a site-specific basis. Similarly, soil erosion modeling is better performed on a project-specific basis when more detailed site and project data are available. |

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| Soil | 2029-2 | Numerous commenters suggested that the BLM more completely define, provide justification for, or otherwise revise its objectives and standards for reclamation and monitoring. Commenters requested that the BLM (1) clarify that reclamation plans would be required for oil and gas drilling operations under all alternatives and (2) provide additional information regarding reclamation plan requirements in LRP areas. Commenters offered many suggestions regarding the optimal balance between specific site-level prescriptions and more general comprehensive reclamation plans. Some commenters expressed their convictions that the proposed accountability mechanisms were insufficient for ensuring successful reclamation, as evidenced by poor revegetation success in existing reclamation areas. | The BLM has updated applicable sections of the Proposed RMP and Final EIS in response to comments, including adding additional information on Natural Resources Conservation Service (NRCS) Ecological Site Descriptions and LRP soils. Soil management requires a site-specific application and cannot be defined; neither can reclamation measures be identified at the RMP level. Specific reclamation objections are based on site-specific analysis. |
| Special Status Species | 2030-1 | Commenters stated that adverse impacts to certain special status species analyzed in the RMP and EIS were in some cases unsupported, exaggerated, and/or inconsistent with existing scientific literature and management directives. Commenters recommended the inclusion of additional scientific data, U.S. Forest Service (USFS) and U.S. Fish and Wildlife Service (USFWS) monitoring and management directives in the RMP and EIS, and the 2005 statewide Canada lynx Biological Assessment (BA).<br><br>Specifically, commenters stated there were deficiencies or errors in the BLM's analysis of the historic range, occupancy, habitat, and adverse impacts resulting from timber management and grazing on Canada lynx, and the impacts of road density, timber management, and buffer size on northern goshawk. Commenters also requested additional evidence to substantiate stated adverse impacts from wild horses and fence construction on desert yellowhead and sensitive bird species, respectively. Commenters suggested that the BLM identify potentially occupied pygmy rabbit habitat in the planning area to substantiate the limitations placed on surface-disturbing activities. | The BLM developed and analyzed impacts to special status species in the Proposed RMP and Final EIS using the best available information in compliance with federal laws, guidelines, and policies. As appropriate, the BLM updated the analysis in applicable sections and added references that support decisions regarding special status species. Specifically, the BLM revised the Proposed RMP and Final EIS to include text to clarify the impacts of timber management, road density, and livestock grazing activities on special status species in the planning area.<br><br>Pygmy rabbit habitat has not been identified for the entire planning area, and the BLM believes that including a map would be misinterpreted as being a complete depiction of habitat. Chapter 3 identifies what constitutes suitable habitat for pygmy rabbit, and the BLM has added text to expand the description of where occupied habitat has been identified. |

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| Special Status Species | 2030-2 | The BLM also received comments on the Draft BA that was released about the same time as the Draft RMP and EIS. One commenter noted that the section on the BA incorrectly reported (1) that no Canada lynx tracks were observed during surveys in the Dubois area and (2) omitted a subsequent Canada lynx detection in Long Creek. Other commenters questioned why the BLM would release the BA prior to selection of the Proposed RMP and recommended the BLM reduce the complexity of the BA. | The BLM has revised the BA and Chapters 3 and 4 of the Proposed RMP and EIS to reflect that Canada lynx have been found in the planning area, but have not been documented on BLM-administered lands. The BLM will announce its final decision on the Proposed RMP in the ROD; the decision is not governed by timing associated with the BA. The BLM believes the BA is appropriately written and not overly complex. |
| Special Status Species | 2030-3 | Commenters raised both specific and general concerns regarding the suitability of management determinations for special status species, and suggested that the BLM provide additional support and clarification for its management direction. Specifically, commenters requested (1) detailed information on BLM management direction and monitoring actions pertaining to special status species protection and habitat, (2) more consistency with USFS and USFWS management directives and determinations, (3) the removal of restrictions for special status species that the USFWS has withdrawn from consideration as threatened or endangered, and (4) greater protections and safety measures for listed species. | The BLM revised the Proposed RMP and Final EIS to reflect recent USFWS decisions, and incorporated, in coordination with the USFWS, USFS, and WGFD, commenter requests for specific revisions and clarifications, technical edits, changes to management actions, and updates to data and mapping, as appropriate. The USFWS and WGFD are the lead authorities responsible for the protection, management, and monitoring of all flora and fauna species in the planning area. Both the USFWS and WGFD provided guidance to the BLM, which is reflected in the special status species sections and management actions in the Proposed RMP and Final EIS. |
| Trails and Travel Management | 2031-1 | Commenters requested that the BLM change route designations to increase restrictions on travel, close areas to motorized and mechanized travel, and enact seasonal road closures to protect wildlife, water quality, wilderness values, and back country recreational experiences. One commenter expressed concern that changes in route designations would have adverse impacts to livestock grazing that are not disclosed in the document. Commenters recommended the BLM complete a comprehensive monitoring program and coordinate with stakeholders before changing route designations to protect wildlife values.<br><br>Commenters also requested the BLM allow for the swift installation of snow fences, address all the road and recreation needs covered in the Fremont County Land Use Plan in coordination with the Fremont County Commission, and allow access to seasonally closed areas and alternative routes if route designations change to limited or closed. A commenter also suggested travel restrictions not apply to geophysical operators to preserve BLM administrative flexibility. | Several commenter requests do not require an RMP decision, are part of a separate process (e.g., Revised Statute 2477 rights or review of Plan of Operations), or will be addressed in the implementation phase in accordance with BLM guidance. Suggestions about specific route management can be made at implementation meetings where there will be opportunities for public input. Authorizations or permits that include motorized vehicle activities will address the use of motorized vehicles as part of the authorization or permit. The BLM added language to the tables of management actions in Chapter 2 to clarify the route designation process in an RMP. In addition, the BLM added Appendix W (p. 1813) to the Proposed RMP and Final EIS that provides additional information on travel management planning and decisions. |

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| Vegetation | 2032-1 | Commenters recommended multiple revisions to the Vegetation sections based on current knowledge of forest management, such as addressing discrepancies in buffer distances, replacing certain vocabulary, and incorporating BMPs. For example, commenters requested replacing the term "clear-cuts" because it has a negative connotation, and incorporating the Wyoming State Forestry Division's Silvicultural BMPs guide. | The BLM updated management and applicable sections of the Proposed RMP and Final EIS, as appropriate. The BLM agrees with the characterization of clear-cut as a negative term; however, scoping clearly identified that clear-cutting needs to be addressed separately from other silviculture techniques. The BLM incorporated the Wyoming State Forestry Division's Silvicultural BMPs in Appendix H (p. 1521). |
| Vegetation | 2032-2 | Commenters stated that the Draft RMP and EIS fails to implement management requirements or limitations to address the needs of vegetation communities when their health is threatened by other resource uses. Commenters suggested clarifying proposed vegetation treatments by adding a timeframe for recovery, and suggested revising a management action to include wildlife habitat objectives. Other commenters suggested management strategies to increase available forage for livestock, such as adding a management action that would allow for the BLM to apportion additional forage for livestock grazing when monitoring has shown that additional forage is available. Commenters also requested clarification on management terms, including "desirable vegetation communities." | Management of all vegetation communities will be based on meeting Wyoming Standards for Healthy Rangelands and the NRCS Ecological Site Descriptions, which provide the reference state from which the standards are measured. The BLM will work with permittees/lessees, cooperators, and the interested public to meet Wyoming Standards for Healthy Rangelands. If standards in these communities fail due to livestock grazing, appropriate actions will be taken and incorporated into the comprehensive grazing strategies defined in Appendix K (p. 1547). Apportioning additional forage for livestock grazing use is already provided for by regulation and does not require changing management in the Proposed RMP and Final EIS.<br><br>The BLM updated vegetation management in Chapter 2 to incorporate wildlife objectives. Proposed vegetation treatments will be identified in cooperation with the WGFD, and together the agencies will identify the specific objectives, including recovery timeframes, for the project. All potential projects will be subject to NEPA analysis and WGFD review related to the Density Disturbance Calculation Tool protocol.<br><br>Desired plant communities will be based on the NRCS Ecological Site Descriptions and managed in a way designed to meet the Wyoming Standards for Healthy Rangelands. Desired plant communities allow for flexibility in management for specific wildlife habitats rather than historic climax plant communities. |

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| Vegetation | 2032-3 | Comments regarding vegetation species composition in reclamation standards for DDAs and non-DDAs include revising text with clarifying language. For example, commenters requested clarification regarding seed mixes, determining species composition, fulfilling species composition percentage requirements, and seeding times and methods. | The BLM revised Appendix D (p. 1477) and applicable sections to address these comments. The standards the BLM uses for reclamation are based on the NRCS Ecological Site Descriptions, including seed mixtures and determining species composition by weight. Site-specific conditions or issues will be addressed in the individual project reclamation plan. |
| Visual Resource Management | 2033-1 | Commenters expressed concern that designating areas with more stringent VRM classifications would adversely impact development operations, including oil and gas development on existing leases. One commenter questioned the need for a large area designated as VRM Class III across the Sweetwater watershed, noting that development in this area was not expected to necessitate a corridor of this size. Another commenter requested that the BLM consider designating the Beaver Rim MLP as VRM Class II in an effort to stay consistent with the surrounding area's VRM.<br><br>Commenters also requested clarification on VRM, including providing a clear explanation of how VRM Classes were determined.<br><br>Commenters requested that the BLM revise VRM maps to more accurately portray the level of development constraints and to show that the BLM VRM restrictions do not apply to privately owned or state-managed lands. | The BLM will not impose new VRM restrictions on existing oil and gas leases. Therefore, the BLM will work with operators to mitigate impacts to the best extent practical (see Washington Office IM No. 98-164). Regarding VRM Class III designation in the Sweetwater watershed, while the VRM Class III designation applies to a larger area, the ROW corridor is much narrower. In the Beaver Rim MLP, the VRM Class III designation reflects other uses in the area, and the BLM did not identify resources that require VRM Class II management.<br><br>The visual resource inventory process is described in Chapter 3 and VRM Classes were developed in collaboration with the cooperating agencies. VRM Classes are not based just on inventory, but also desired management for the area.<br><br>The BLM believes the identified maps accurately portray development constraints in VRM Class II areas. The BLM does not assert the right to apply VRM restrictions to state and private lands; the maps are illustrative of management, not management itself. |
| Water | 2034-1 | Commenters stated that the water resource analysis did not include recent data or current scientific reports pertaining to the characterization and classification of specific water resources and their uses in the planning area. Commenters stated that the analysis did not provide accurate data or baseline conditions for water resources indicators that would allow for an evaluation of potential impacts, including chemical, physical, and biological characteristics. Commenters also questioned the validity of statements and language used to support BLM management decisions pertaining to water quality standards and water levels in the planning area, and requested clarification on implementation of proposed BLM water monitoring actions. Finally, commenters stated that the analysis did not consider the beneficial uses of water produced by development activities, | The BLM has updated the Proposed RMP and Final EIS to address comments as appropriate. The agency updated applicable sections to include a discussion of impacts from nonpoint source pollution, clarify inventory and monitoring requirements, clarify impacts on groundwater, include analysis of sensitive drinking water resources, and included scientific references to support the analysis. The BLM determined that impacts of produced water are better analyzed on a site-specific basis, where actual water quality and stream conditions are known. |

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| | | including, but not limited to, improvements in natural water quality in planning area waterways, livestock/wildlife resources, and the creation of riparian zones and wetlands. Commenters also requested the BLM remove a statement asserting oil and gas techniques impact groundwater. | |
| Water | 2034-2 | Commenters asserted that the BLM stated goals and objectives do not reflect those provided by the state, and requested justification or clarification concerning several management actions. Commenters also questioned the BLM's authority to regulate surface water quality, which they noted was under the jurisdiction of Wyoming DEQ, and requested the BLM clearly state the Wyoming DEQ has primacy regarding water issues.<br><br>Commenters noted several technical corrections and inaccurate statements pertaining to management of produced water and water quality standards, and suggested edits and/or items for inclusion. Commenters also requested that the BLM include additional protective management for water resources. Specifically commenters requested NSO restrictions in areas near drinking water resources and clarification on how water management actions and BMPs will be implemented and monitored. | The BLM has updated the Proposed RMP and Final EIS in response to the comments. Changes were made to applicable sections regarding the use of pesticides and herbicides in water source areas, clarify that Wyoming DEQ regulates water quality, and update monitoring for groundwater. The BLM has determined that the RMP and EIS adequately addressed protection for water resources, including limitations on surface-disturbing activities near drinking water resources and implementation of BMPs. |
| Wild and Scenic Rivers | 2035-1 | Commenters requested that the BLM reconsider the eligibility/suitability of several waterways for inclusion in the National Wild and Scenic River System. Specifically, commenters recommended including a specific segment of Warm Springs Creek due to its Wild and Scenic River (WSR) status for the portion on adjacent USFS land, and segments of the Little Popo Agie and Sweetwater rivers due to their outstanding remarkable values. A commenter also stated that the RMP does not adequately describe other mechanisms in place to protect certain qualities of WSR-eligible segments. | After additional review, the BLM determined Segment 1 of Warm Springs Creek was suitable for inclusion in the National Wild and Scenic River System and revised the Proposed RMP and Final EIS to reflect this change. Extensive mechanisms are in place to protect qualities of WSR-eligible segments, including cultural resource management, and management associated with Congressionally Designated Trails. |

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| Wild and Scenic Rivers | 2035-2 | Commenters requested that the BLM incorporate management prescriptions into the RMP and EIS that would limit adverse impacts to Outstandingly Remarkable Values for all eligible and suitable river segments, including, but not limited to, the following: manage certain segments as VRM Class I and II; manage mineral and realty actions within ¼ mile of a segment with category 6 restrictions; let mineral leases within ¼ mile of segments expire; prohibit or mitigate water impoundments, diversions, or hydroelectric power facilities in river segments; close segments to motorized and mechanized vehicles; close timber harvest within river corridors; and intensive management of livestock grazing within river corridors. Commenters also requested that the BLM clarify if the nine segments will be managed to protect their Outstandingly Remarkable Values (as under Alternative A) under Alternative D, independent of recommendations to Congress. | The BLM updated the Proposed RMP and Final EIS to incorporate some of the recommended prescriptions. Other management prescriptions are effectively covered under the Proposed RMP or will be addressed during implementation. During the RMP process, the BLM decides if Outstandingly Remarkable Values meet eligibility and suitability criteria for potential congressional WSR designations. Waterways found to meet the suitability criteria receive protective management until such time Congress decides whether to designate the waterway. Waterways deemed eligible but not suitable are removed from further consideration for protection under the WSR program. This does not preclude these waterways from protections to support other programs, such as recreation, cultural and visual resources, and wildlife. The difference between the alternatives in relation to eligible waterways not deemed suitable is included in the WSR section in Chapter 4. |
| Wild Horses | 2036-1 | Commenters stated that the Draft RMP and EIS does not adequately assess the impacts of proposed management on wild horses in the planning area, that the existing conditions of Herd Areas (HAs) and Herd Management Areas (HMAs) are not adequately described, and that the BLM did not complete their analysis with current monitoring data or supporting scientific research. | The BLM reviewed all parts of the document associated with the wild horses analysis and determined the information, as stated, is valid. Management associated with wild horses is based on BLM Manual 4700, and the Proposed RMP and Final EIS complies with measures described in the manual. The BLM collects monitoring information in the planning area HAs and HMAs, including horse herd inventory, observations, use of riparian-wetland areas, livestock use, and precipitation, and the BLM used the information in the analysis. |
| Wild Horses | 2036-2 | Commenters expressed concern about the adequacy of proposed management practices for wild horses in the planning area. Specifically, commenters questioned the effectiveness of proposed management methods for addressing genetic viability and health, gather activities, and actions for meeting established population numbers. Commenters requested revisions and additional details on how the BLM will implement BMPs for the maintenance, monitoring, and management of extant wild horse populations, offered suggestions for improved wild horse viewing opportunities and reduced viewing opportunities, and requested the option for converting portions of AUMs allotted for livestock use to wild horses/herds.<br><br>Commenters provided recommendations on management of wild horses that would both expand and alter management for | Management associated with wild horses is based on BLM Manual 4700. The BLM made technical edits and revised management actions in Chapter 2 for clarity, and added Appendix V (p. 1805), which includes detailed information on wild horse management practices, implementation of BMPs, and recreation opportunities associated with wild horses.<br><br>The appropriate management levels in the planning area were established in 1993 and 1994. The BLM believes that the appropriate management levels are satisfactory for the current HMAs within its jurisdiction; moreover, the appropriate management levels were established in the Consent Decree, which is still in effect and has been made available on the project website. |

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| | | wild horse herds and ranges, including increasing appropriate management levels. | |
| Wilderness Characteristics | 2037-1 | Commenters expressed confusion regarding guidance on lands with wilderness characteristics and stated the BLM did not provide justification for managing areas as non-Wilderness Study Area (WSA) lands with wilderness characteristics. Regarding management of these areas, multiple commenters recommended prohibiting or limiting motorized travel in lands with wilderness characteristics, while other commenters recommended managing them as ROW exclusion areas in an effort to protect primitive values. Commenters also suggested increasing the size of areas or removing areas with wilderness characteristics under Alternative D. In addition, commenters expressed a need for further inventories of resources in lands with wilderness characteristics to determine how impacts should be managed, with inventories completed using guidance found in IM 2011-154. | The BLM will manage non-WSA lands with wilderness characteristics as authorized by IM 2011-154. The BLM's inventory of lands with wilderness characteristics fully complies with this IM, and provides adequate rationale for the BLM's proposed management of non-WSA lands with wilderness characteristics.<br><br>The BLM will evaluate closing or limiting motorized travel in specific areas during travel management implementation planning. However, the BLM updated the Travel Management section to include additional protections for the Greer Peak and Lysite mountain regions. |
| Wilderness Study Areas | 2038-1 | Commenters questioned if WSAs near populated areas or containing roads should remain designated as WSAs, while other commenters indicated WSAs should be expanded as recommended in the 1994 citizens' recommended wilderness report. One commenter noted the BLM did not identify or recommend any new areas for wilderness protection in Wyoming.<br><br>Multiple commenters recommended closing or limiting motorized and mechanized travel in WSAs. In addition, commenters indicated a need for further inventories of resources in WSAs to determine how impacts should be managed, specifically in riparian zones. Other comments included requests to withdraw WSAs from mineral entry and imposing Category 5 restrictions in WSAs to protect wildlife. One commenter recommended the BLM not manage WSAs according to WSA management policy, in the event Congress releases those lands for multiple use management. | The BLM does not have the authority to adjust or make changes to existing WSAs.<br><br>The BLM manages WSAs under BLM Manual 6330, *Management of Wilderness Study Areas*. The BLM concluded that if motorized use is found to conflict with wilderness values, that route will be closed or the impacts mitigated. Therefore, no route will be found to be non-conforming to the wilderness values. In addition, mechanized use is not prohibited by BLM Manual 6330, and there have been no documented cases where mechanized use is conflicting with wilderness values. If this does occur, the BLM will use implementation planning to address these conflicting uses. |
| Wildlife | 2039-1 | Commenters raised several concerns about the BLM's management of wildlife resources and identified information gaps in the wildlife analysis. Specifically commenters raised concerns regarding (1) the impacts of wildlife protections and seasonal restrictions on other resources and energy | The BLM updated wildlife management in the alternatives and other wildlife-related text in the Proposed RMP and Final EIS in response to the comments. Specifically, the BLM updated management actions in Chapter 2, clarified terminology, clearly identified areas open and closed to leasing under each |

| Issue | Summary Number | Summary Comment | Summary Response |
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| | | developments, (2) clarification on protective stipulations and annual timing of stipulations, and (3) whether BLM management actions are supported by field verified and/or cited scientific reference documents. In addition, commenters requested additional detailed information regarding management in special habitat designations, protection of big game species and crucial winter ranges, grazing restrictions in wildlife areas, and impacts on amphibian and raptor species. Commenters also identified outdated data presented on wildlife maps. | alternative, added scientific references and citations to support the analysis, and made other revisions, as appropriate. The agency revised Chapters 3 and 4 to clarify wildlife habitat ranges and designations, impacts, and protections.<br><br>The maps presented in the Draft RMP and EIS are representative of data available at the time they were prepared. The BLM will obtain updated survey information for raptor nests once a federal action is authorized. The agency has updated the maps in the Proposed RMP and Final EIS to reflect recently updated data for big game winter range and greater sage-grouse leks. |

## X.4.3. Non-Substantive Comments

In addition to the substantive comments summarized and responded to above, the BLM received numerous non-substantive comments during the public comment period. In accordance with BLM NEPA Handbook (H-1790-1), a formal response to non-substantive comments is not required; however, the BLM has reviewed and acknowledges all comments it received. Non-substantive comments generally included:

- Comments in favor of or against management alternatives and allocations without reasoning that meet the criteria for substantive comments (e.g., we disagree with the Preferred Alternative and believe the BLM should select Alternative C)
- Comments that only agreed or disagreed with BLM policy or resource decisions without justification or supporting data that meet the criteria for substantive comments (e.g., the BLM needs to better manage oil and gas development in the planning area)
- Comments that did not pertain to the Lander Field Office planning area
- Comments that were outside the scope of analysis for the RMP and EIS (such as comments related to revision and update of laws, policies, and regulations)
- Comments that took the form of vague, open-ended questions or statements that did not meet the criteria for substantive comments

## X.5. Conclusion

The BLM revised the Draft RMP and EIS and prepared the Proposed RMP and Final EIS in response to substantive public comments received during the public comment period. The BLM will continue to consider public, agency, and other stakeholder comments through completion of the Lander RMP revision, as appropriate.