



U.S. Department of the Interior
Bureau of Land Management - Farmington Field Office
Bureau of Indian Affairs - Navajo Regional Office

February 2020

Farmington Mancos-Gallup

Draft Resource Management Plan Amendment and Environmental Impact Statement

Volume 1



MISSION STATEMENTS

BLM

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BIA

The Bureau of Indian Affairs' mission is to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of American Indians, Indian tribes, and Alaska Natives.



United States Department of the Interior



BUREAU OF LAND MANAGEMENT Farmington Field Office BUREAU OF INDIAN AFFAIRS Navajo Regional Office

In Reply Refer To
LLNM004000 (1610)

Feb. 28, 2020

Dear Reader:

Attached for your review and comment is the Bureau of Land Management Farmington Field Office's (BLM) and Bureau of Indian Affairs Navajo Regional Office's (BIA) Farmington Mancos-Gallup draft Resource Management Plan Amendment (RMPA) Environmental Impact Statement (EIS). The BLM and the BIA jointly prepared this document in consultation with cooperating agencies, and in accordance with the National Environmental Policy Act of 1969; Council on Environmental Quality regulations implementing NEPA (40 CFR 1500-1508); DOI NEPA regulations (43 CFR 46); and the requirements of the BLM's NEPA Handbook, H-1790-1 and the BIA's NEPA Guidebook, 59 Indian Affairs Manual 3-H.

The BLM decision area includes approximately 2 million acres of BLM-managed surface lands and federal mineral estate. In some portions of the planning area, the BLM administers the surface lands while another entity owns the mineral estate; in other areas, the BLM administers federal mineral estate, while another entity owns and manages the surface lands. The BIA decision area includes approximately 1.7 million surface acres divided between Navajo Tribal Trust lands and Navajo Individual Indian allotments. Similar to the BLM, the BIA administered lands are also considered split estate (surface owner different from mineral owner).

For the BLM, this EIS will be amending the Farmington Field Office 2003 Resource Management Plan (RMP) to analyze the potential impacts to the BLM from changing oil and gas development patterns. For the BIA, this EIS will be used to evaluate alternatives and issues related to its authority over mineral leasing and associated activity decisions in the planning area. It is necessary to adapt to changing patterns of land use, while providing for multiple use and protecting valid existing rights. As part of this RMPA/EIS, the BLM and BIA are analyzing oil and gas leasing development, along with two related issues: realty actions and vegetation management. The BLM will also analyze the lands with wilderness characteristics. The Farmington Mancos-Gallup RMPA/EIS and supporting information are available on the project website at:

<https://www.blm.gov/programs/planning-and-nepa/plans-in-development/new-mexico/farmington-rmp-mancos-gallup-amendment>

The BLM and BIA invite and encourage the public to provide information and comments pertaining to the analysis presented in the draft Farmington Mancos-Gallup RMPA/EIS. Comment submissions should be specific and substantive in nature, referencing the document's chapter or appendix and the specific page of the document, and address one or more of the following:

- Identify inaccuracies or discrepancies in information;
- Identify new information that would have a bearing on the analysis;
- Identify new impacts, alternatives, or mitigation measures;
- Make suggestions for improving the proposed resource management direction.

Comments can be submitted via the BLM ePlanning website, email, or a mailing service. For your convenience, the BLM and BIA invites you to use one of the comment submission options below:

- BLM ePlanning website:
 - <https://eplanning.blm.gov>
- BLM Farmington Field Office RMP email address:
 - blm_nm_ffo_rmp@blm.gov
- Comments may also be submitted by mail to:

Ms. Jillian Aragon, BLM Project Manager
Attn: RMPA Comment Submission
Bureau of Land Management
6251 College Blvd, Suite A
Farmington, NM 87402

Or

Mr. Robert Begay, BIA Project Manager
Attn: RMPA Comment Submission
Bureau of Indian Affairs Navajo Regional Office
P.O. Box 1060
Gallup, NM 87301

In January 2020, the Navajo Nation Council withdrew their support of a ten-mile buffer zone surrounding Chaco Culture National Historical Park (CCNHP). The Navajo Nation Council instead approved language supporting a five-mile Federal buffer surrounding CCNHP that would provide additional protections to sacred cultural sites, while still allowing allottees to develop their mineral estates beyond the five-mile buffer area. The BLM and the BIA request comments from the public on the EIS and its alternatives as well as comments on whether a five-mile Federal buffer around CCNHP should be considered.

Comment submissions based solely on opinion or preference will be considered and included as part of the decision-making process and administrative record; however, opinion or preference comment submissions will not receive a formal response from the BLM and BIA.

In developing the final RMPA/EIS, which represents the next phase of the planning process, the BLM and BIA may select various management decisions from each of the alternatives analyzed in the Farmington Mancos-Gallup RMPA/EIS for the purpose of creating a management strategy that best meets the needs of the resources and values in the planning area under BLM and BIA mandates. As a member of the public, your timely input on the Farmington Mancos-Gallup RMPA/EIS will aid in formulation of the final proposed RMPA/EIS. Comments will be accepted for ninety (90) calendar days following the Environmental Protection Agency's publication of the Notice of Availability in the *Federal Register*. The BLM and BIA can best utilize your comments and resource information submissions if received within the review period.

Before including your address, phone number, email address, or any other personal identifying information in your comment, be advised that your entire comment, including your personal identifying information, may be made publicly available. While you can ask us in your comment to withhold your personal identifying information from public review, neither the BLM nor the BIA can guarantee that we will be able to do so.

Public meetings intended to provide an overview of the document, respond to questions, and accept public comments will be announced through local media, the BLM New Mexico website, and/or public mailings at least 15 days in advance. Public meetings will be held at a time and place to be determined.

Copies of the draft Farmington Mancos-Gallup RMPA/EIS have been sent to affected Federal, Tribal, state, and local government agencies. Printed or electronic copies are also available for public inspection at the following BLM and BIA locations:

Bureau of Land Management
New Mexico State Office
301 Dinosaur Trail
Santa Fe, NM 87508

Bureau of Land Management
Farmington Field Office
6251 College Blvd., Suite A
Farmington, NM 87402

Navajo Nation Library
Highway 264 Loop Road
Window Rock, AZ 86515

Pueblo Pintado Chapter House
Cuba, NM

Ojo Encino Chapter House
Ojo Encino, NM

Counselor Chapter House
6828 Highway 44
Counselor, NM 87018

Nageezi Chapter House
1153 US-550
Nageezi, NM 87037

Lake Valley Chapter House
7750 NM-371
Crownpoint, NM 87313

Whitehorse Lake Chapter House
Cuba, NM

Torreon Chapter House
Cuba, NM

Bureau of Indian Affairs
Navajo Regional Office, Room 356
1060 West Hill Avenue
Gallup, NM 87301

Bureau of Indian Affairs
Eastern Agency Office
222 Chaco Blvd.
Crownpoint, NM 87313

Farmington Public Library
2101 Farmington Ave.
Farmington, NM 87401

Huerfano Chapter House
536 Road 7150
Bloomfield, NM 87413

Upper Fruitland Chapter House
Fruitland, NM

San Juan Chapter House
Lower Waterflow, NM

Hogback Chapter House
Shiprock, NM

Burnham Chapter House
Newcomb, NM

White Rock Chapter House
Crownpoint, NM

Becenti Chapter House
Crownpoint, NM

Thank you for your continued interest in the Farmington Mancos-Gallup RMPA/EIS. The Department of the Interior greatly appreciates your input to the land use planning process.

For additional information or clarification regarding this document or the planning process, please contact Ms. Jillian Aragon at (505) 564-7722 or Mr. Robert Begay at (505) 863-8515.

Sincerely,

**TIMOTHY
SPISAK**

Timothy Spisak
BLM New Mexico
State Director

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**BARTHOLOMEW
W STEVENS**

Bartholomew Stevens
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Regional Director

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- O Cooperating Agencies
- P List of Preparers

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Executive Summary

ES.1 INTRODUCTION

The United States (US) Department of the Interior (DOI), Bureau of Land Management (BLM), Farmington Field Office (FFO) published an environmental impact statement (EIS) and Resource Management Plan (RMP) in 2003 (the 2003 RMP) to outline management decisions and guidance for the FFO (BLM 2003).

In 2012, the BLM decided to produce an EIS to examine changing oil and gas development patterns in the Mancos Shale and Gallup Sandstone (Mancos/Gallup) formations, including innovations in horizontal drilling technology and multistage hydraulic fracturing. The BLM will use this EIS to consider amending decisions in the 2003 RMP related to impacts of oil and gas development. The Farmington Mancos Gallup (FMG) Resource Management Plan Amendment/Environmental Impact Statement (the FMG RMPA/EIS) and initial scoping period were announced in a Notice of Intent (NOI) published in the *Federal Register* on February 25, 2014. After the initial scoping period ended in May 2014, the BLM began developing its alternatives for the EIS. From this scoping, the BLM identified the following resources (in addition to oil and gas) that are in need of updated management and will therefore be analyzed as part of the FMG RMPA/EIS: vegetation management, lands with wilderness characteristics, and realty actions specifically related to oil and gas, such as right-of-way (ROW) development.

In 2016, the Bureau of Indian Affairs (BIA), Navajo Regional Office (NRO) became a co-lead agency for the EIS. The BIA NRO has leasing decision-making authority for the Navajo Nation on Navajo Tribal trust lands and individual Navajo allottees on Navajo individual Indian allotments (hereinafter referred to as Navajo Tribal trust and individual Indian allotments, respectively). The BLM and BIA share management responsibilities related to oil and gas development on Navajo Tribal trust and individual Indian allotted lands in this same area. The BIA will use the EIS to evaluate alternatives and resource impacts related to its authority over mineral leasing and associated activity decisions in the planning area. The NOI announcing that the BIA had joined the project was published in the *Federal Register* on October 21, 2016.

ES.2 DESCRIPTION OF THE PLANNING AREA AND DECISION AREAS

The planning area consists of 4,189,460 acres of the BLM FFO and BIA NRO, including lands managed by the BLM, the BIA (Tribal trust lands and individual Indian allotments), the State of New Mexico, the Forest Service, the National Park Service (NPS), the Bureau of Reclamation (BOR), and New Mexico Game and Fish; it also includes private property and Navajo Tribal fee lands. The planning area is larger than the decision areas so that the BLM and BIA could evaluate the reasonably foreseeable development (RFD) of the Mancos/Gallup formations across the San Juan Basin of Northern New Mexico, regardless of the owner or manager of the land. Thus, the planning area is based on the physical location of the Mancos/Gallup formations in northwestern New Mexico. The decision areas, on the other hand, consist of the surface land and subsurface mineral estate in the planning area under the BLM's and BIA's authority to make land use and management decisions.

In total, between the administrative authority of the BLM and the BIA, the decision areas are approximately 62 percent of the planning area. Much of the mineral estate in the decision areas where the BLM or the BIA has administrative authority is already leased. Approximately 1.8 million acres are covered by 2,270 active leases, including 2,300 leases on BLM-managed minerals and 560 leases on BIA-managed minerals.

ES.2.1 BLM Decision Area

The total BLM decision area is made up of approximately 2 million acres of BLM-managed surface lands and federal mineral estate. Because the surface and minerals of some lands are owned or managed by two

different entities, the BLM has divided its decisions for the FMG RMPA/EIS into surface decisions and mineral decisions. The BLM surface decision area includes all surface land that it manages, regardless of the subsurface owner or manager. The BLM mineral decision area includes federal mineral estate managed by the BLM, regardless of the surface owner or manager.

The Forest Service determines the stipulations for the lands it manages; because of this, those lands and the federal minerals beneath them are not part of the BLM surface or mineral decision area for the FMG RMPA/EIS. Similarly, NPS lands and the minerals beneath them are withdrawn from mineral entry and are not part of the BLM surface or mineral decision area for the FMG RMPA/EIS.

ES.2.2 BIA Decision Area

The BIA decision area includes approximately 900,000 surface and mineral estate acres divided between Navajo Tribal trust and individual Indian allotments for which the BIA NRO has authority to make decisions regarding mineral leasing and associated activities. Tribal trust lands of the Jicarilla Apache Nation and the Ute Mountain Ute Tribe, which are adjacent to BLM-managed lands and federal mineral estate in the FFO, are not part of the BIA decision area, although they are part of the planning area.

Because there are areas where the surface and minerals are owned or managed by two different entities, the BIA has divided its decisions for the FMG RMPA/EIS into surface decisions and mineral decisions. The BIA surface decision area includes all Navajo Tribal trust and individual Indian allotment surface land, regardless of the subsurface owner or manager.

ES.3 PURPOSE OF AND NEED FOR THE BLM AND BIA ACTIONS

ES.3.1 Purpose of and Need for the BLM Action

The primary purpose of this planning action is to adapt to changing oil and gas development patterns, while providing for multiple use and protecting valid existing rights. This will be accomplished by amending the 2003 RMP to analyze the potential impacts on the FFO from oil and gas innovations, including horizontal drilling technology and multistage hydraulic fracturing. These innovations may result in more wells and different surface disturbances and impacts in the FFO than were analyzed in the 2003 RMP. Additionally, this amendment will update the BLM's analysis of realty actions, vegetation management, and lands with wilderness characteristics in the FFO.

ES.3.2 Purpose of and Need for BIA Action

The purpose of the FMG RMPA/EIS is to develop leasing stipulations and other oil and gas development criteria through the EIS process. The BIA will use these to guide the management of oil and gas trust resources owned by the Navajo Nation and individual Indian allottees in response to potential impacts on the Navajo communities in the planning area due to changing oil and gas development patterns in the Mancos/Gallup formations; examples are horizontal drilling technology and multistage hydraulic fracturing, along with associated development activities. This includes addressing the surface, subsurface mineral, and split-estate for Tribal trust and individual Indian allotments in the planning area, while developing BIA and FIMO leasing stipulations that maximize the mineral owner's best economic interest and that minimize any adverse environmental or cultural impacts resulting from such development, in accordance with 25 CFR 211.

ES.4 PLANNING ISSUES

ES.4.1 Issues Addressed in the RMPA/EIS

Based on the 2014 BLM public scoping comments, the BLM and BIA carried forward and modified four preliminary planning issues: oil and gas leasing and development, realty actions, vegetation management, and lands with wilderness characteristics.

ES.5 OVERALL VISION

The overall vision for BLM-managed lands for the FMG RMPA/EIS is to facilitate development of federal mineral resources while improving natural, cultural, and open space values across the landscape to protect human health and the environment and pursue recreation opportunities through partnerships and collaboration for the enjoyment and use by the growing and diverse population and future generations.

The BIA's overall vision for the FMG RMPA/EIS process is to manage oil and gas development so as to enhance the quality of life, promote economic opportunity, and carry out the responsibility to protect and improve the trust assets of American Indians, Indian Tribes, and Alaska Natives.

ES.6 ALTERNATIVES CONSIDERED FOR DETAILED ANALYSIS

The action alternatives—A, B, C, and D—for both the BLM and BIA offer a range of possible management approaches for responding to the planning issues. Each of the alternatives addresses resource program goals in varying degrees, with the potential for different long-range outcomes and conditions.

Unlike those of the BLM, the suite of alternatives developed by the BIA does not include acreage allocations because it does not include actions that lend themselves to mapping; therefore, there is no equivalent comparative summary table of allocation acres associated with the BIA alternatives. They incorporate themes and federal responsibilities that are common to both agencies but include elements that reflect the unique mission of the BIA and features of Tribal self-government.

ES.6.1 Management Common to All Alternatives

Certain allowable uses and management actions from the 2003 RMP are relevant to the four planning issues addressed in the FMG RMPA/EIS and remain valid; therefore, they do not require revision. They have been carried forward in the No Action Alternative and Alternatives A, B, C, and D. Other decisions are common only to the action alternatives, Alternatives A, B, C, and D.

Although each alternative is distinct in the resources and resource uses it emphasizes, all five share certain management common to all alternatives as indicated in **Section 2.3.1**.

In addition to existing federal, Tribal, and state regulations, the BIA has incorporated by reference certain stipulations listed in **Section 2.3.1** into all BIA alternatives, except where a proposed change is indicated.

Table ES-1
BLM and BIA Alternatives Summary

Alternative	BLM	BIA
No Action	Continue 2003 RMP management direction	Continue current management of leasing practices
A	Manage and enhance habitats with measures designed to support natural ecosystems	Protect and enhance natural ecology, with protection of sensitive wildlife areas and natural resources
B (including BLM Sub-alternatives B1 and B2)	Preserve Chacoan and cultural landscapes; prioritize preservation of cultural and paleontological properties, including specific measures proposed by stakeholders	Preserve and protect the cultural and natural landscapes unique to northern New Mexico
C (including BLM Sub-alternatives C1 to C6)	Balance community needs and development, while enhancing land health	Allow development to occur in harmony with the traditional, historic, socioeconomic, and cultural lifeways of the planning area
D	Maximize resources that target economic outcomes, while sustaining land health	Maximize resources production and royalty income for Navajo Nation and Tribal allottees and minimize and mitigate impacts on the surrounding communities

ES.7 COMPARISON AND SUMMARY OF CONSEQUENCES BY ALTERNATIVE

The environmental consequences portion of the FMG RMPA/EIS presents the potential direct, indirect, and cumulative impacts on the human and natural environment that could occur from implementing each of the alternatives. Key findings of the impact analysis are summarized below. These summaries are based on the key resource issues identified by the agencies during public scoping. The impacts of the alternatives are separated by the decision-making space unique to each agency.

ES.7.1 Summary of BLM Environmental Consequences Key Findings

Air

More surface disturbance and more predicted oil and gas wells under the BLM No Action Alternative would result in a greater potential for new sources of criteria air pollutants, hazardous air pollutants, and greenhouse gas emissions into the planning area under this alternative. The BLM No Action Alternative and BLM Alternatives C (including BLM Sub-Alternatives C1-C6) and D would all have a similar potential for new sources of emissions. Air emissions are predicted to be the least under BLM Sub-Alternative B2 and second least under BLM Alternatives A and B1.

Water

The BLM action alternatives would all provide for the protection of water resources and 303(d) streams through various closures to fluid mineral leasing, no surface occupancy (NSO) stipulations for fluid minerals, and ROW exclusion areas. Under all alternatives, impacts would be further mitigated wherever the BLM applied conditions of approval (COAs) to minimize impacts on seeps and springs and where it relocated proposed oil and gas facilities as needed, up to 656 feet (200 meters), using its authority under BLM regulations (43 Code of Federal Regulations [CFR] 3101.1-2) to avoid impacts on these resources. BLM Alternative B would be the most protective of water resources out of the action alternatives, while BLM Alternative D would be the least protective.

Fluid Minerals

The 2019 RFD scenario (**Appendix I**) predicts that up to 1,873 new oil and gas wells could be drilled on federal mineral estate over the next 20 years under the BLM No Action Alternative. Under BLM Alternative A, the most unleased acres with high or moderate oil and gas development potential would be closed to mineral leasing or subject to NSO stipulations, resulting in up to 1,399 projected new wells. More unleased high- and moderate-potential acres would be closed to mineral leasing or subject to NSO stipulations under BLM Sub-Alternatives B1 and B2 than under the BLM No Action Alternative, resulting in up to 1,402 and 1,125, respectively, projected new wells. Management under BLM Sub-Alternatives C1-C5 would close the same amount of unleased high- and moderate-potential acres as the BLM No Action Alternative, but more acres would be subject to NSO stipulations, resulting in up to 1,865 projected new wells. Management under BLM Sub-Alternative C6 would close more unleased moderate-potential acres and manage more acres as subject to NSO stipulations than the BLM No Action Alternative, resulting in up to 1,853 projected new wells. Management under BLM Alternative D also would close the same amount of acres as the BLM No Action Alternative, but fewer acres would be subject to NSO stipulations, resulting in up to 1,873 projected new wells.

Vegetation

Impacts on vegetation from oil and gas development, such as habitat fragmentation, disruption, and reduced cover of native plant species have the potential to occur under all the BLM alternatives. Of the BLM action alternatives, BLM Sub-Alternative B2 is the most protective of these resources with the least acres open to leasing, while BLM Alternative D is the least protective of vegetation, with the most acres open to leasing.

Geology

Under BLM Alternatives A, B, and C, there is less potential for surface disturbance to have impacts on traditional mineral gathering areas and culturally significant geologic formations due to closures and restrictions on surface occupancy. However, increased acreages open for surface occupancy without restrictions under the BLM No Action Alternative and BLM Alternative D would increase the potential for surface disturbance and therefore potential impacts on traditional mineral gathering areas and culturally significant geologic formations.

Cultural Resources

Potential impacts on cultural resources that would affect qualities that make historic properties and Tribal CIMPPs eligible for the National Register of Historic Places or Navajo Nation Register of Historic Places could occur under all BLM alternatives. Proposed closures, NSO, controlled surface use (CSU), and timing limitations (TLs), and ROW exclusion and avoidance areas would protect CIMPPs and Chacoan resources. The application of these stipulations and ROW allocations would vary across alternatives. Resources would be most protected under BLM Sub-Alternative B2, which has the least number of acres open for development without stipulations, and least protected under BLM Alternative D, which has the greatest number of acres open for development without stipulations.

Native American Tribal Interests and Uses

Potential impacts on Native American and Tribal interests, such as impacts on CIMPPs or light pollution of dark skies, could occur under all BLM alternatives. Proposed closures to leasing; NSO, CSU, and TL stipulations; and ROW exclusions would protect CIMPPs and water-related Indian Tribal assets. The application of these stipulations and ROW allocations would vary across alternatives. Resources would be most protected under BLM Sub-Alternative B1, which has the least number of acres open for development without stipulations, and least protected under BLM Alternative D, which has the greatest number of acres open for development without stipulations.

Lands and Realty

ROW placement would be restricted through varying degrees of ROW avoidance or exclusion criteria under BLM Alternatives A and B. This would limit the siting of new fluid mineral infrastructure but would encourage the use of ROW corridors and concentrate surface disturbance around existing infrastructure. ROW placement would be slightly more restricted under BLM Alternatives C and D than the BLM No Action Alternative. Under all BLM action alternatives, consideration of 3,400 acres of lands for exchange with the NPS could allow for more effective management of the Chaco Culture National Historical Park (CCNHP) if the exchange were to occur.

Lands with Wilderness Characteristics

More acres (24,300) of lands with wilderness characteristics would be managed to protect those characteristics as a priority over other multiple uses under BLM Alternatives A and B resulting in a reduced potential for impacts on certain wilderness characteristics such as naturalness and opportunities for solitude or primitive recreation. The BLM would emphasize other multiple uses as a priority over protecting wilderness characteristics in all units of lands with wilderness characteristics under the BLM No Action Alternative and BLM Alternatives C and D, which could impact naturalness and opportunities for solitude or primitive recreation.

Social and Economic Uses

The BLM alternatives strike different balances between traditionally defined monetized market economics and other values, such as provision of ecosystem services, cultural services, and nonmarket values. BLM Alternative A would prioritize conservation and enhancement of natural systems, which may positively affect a wide range of ecosystem services and nonmarket values in the planning area. Market-driven

development and production, such as fluid mineral development, would not be the primary focus and would be reduced from current economic contributions under the BLM No Action Alternative. BLM Alternative B prioritizes protection of Chacoan and cultural landscapes in the planning area over market production values. BLM Alternative C proposes to balance market-driven development, such as for fluid minerals, with the needs of the many communities and groups in the planning area, while maintaining land health. Commodity output would be slightly less than under the BLM No Action Alternative. BLM Alternative D prioritizes development of traditional market resources, such as fluid minerals, while sustaining land health. Of all the alternatives, BLM Alternative D has the greatest potential for impacts on ecosystem services and nonmarket values in the planning area; commodity output also would be the highest under this alternative.

Public Health and Safety

Under all BLM alternatives, risks to public health and safety would increase from current levels as development continues in the planning area. Because overall projected development would be the lowest under BLM Alternatives A and B (including BLM Sub-Alternatives B1 and B2), generalized risks to public health and safety from air emissions, noise, light pollution, and traffic would also decrease. Application of NSO stipulations and ROW avoidance areas of varying sizes around residential and community structures would decrease localized health and safety impacts, such as noise and light disturbance, in those commonly used areas. These impacts would be reduced under all action alternatives compared with the BLM No Action Alternative.

ES.7.2 Summary of BIA Environmental Consequences Key Findings

Air

There would be no direct impacts on air resources from fluid mineral leasing under any BIA alternatives. Indirect impacts on air quality from oil and gas development on BIA-managed lands would be as described under **Section ES.7.1**, Summary of BLM Environmental Consequence Key Findings, *Air*. The BIA No Action Alternative and Alternatives C and D would have a similar potential for new sources of oil and gas-related emissions; emissions would likely be the least under Alternative A and second least under Alternative B. Varying requirements across the BIA action alternatives, such as collocating infrastructure, sharing common ROWs, and directional drilling would minimize surface disturbances and associated impacts on air quality and air quality related values.

Water

The Navajo Nation's rights respecting the use of water would continue to be unimpaired, allowing the Navajo Nation to control how fluid mineral activities affect water resource conditions, water quality, and water supplies. The BIA action alternatives would all maintain water resources more effectively than the BIA No Action Alternative, with BIA Alternative A being the most protective of water resources.

Fluid Minerals

Setback distance stipulations that vary across all BIA alternatives would reduce the mineral resources accessible for extraction. Larger setback distances under BIA Alternatives A, B, and C would result in fewer acres open for mineral extraction when compared with the BIA No Action Alternative. Less restrictive setbacks would result in the greatest number of acres open for mineral extraction under BIA Alternative D.

Vegetation

Surface disturbance and resulting impacts, such as habitat fragmentation and reduced cover of native vegetation is likely to occur under all BIA alternatives. Reclamation measures introduced in the BIA action alternatives would protect vegetation and reduce the likelihood of impacts.

Geology

Under each of the BIA action alternatives, required reclamation of wells sites and surface disturbance would result in less potential for surface disturbance to have impacts on traditional mineral gathering areas and culturally significant geologic formations.

Cultural Resources

Impacts on cultural resources could still occur under all BIA alternatives. Stipulations under all BIA action alternatives, such as setbacks for development from structures and CIMPPs, and varying degrees of light and noise pollution mitigation requirements would serve to protect cultural resources. BIA Alternatives B and C offer the most protection for cultural resources, while BIA Alternative D offers the least protection of the action alternatives.

Native American and Tribal Interests

Impacts on Native American and Tribal Interests could still occur under all BIA alternatives. However, enforceable stipulations and mitigation requirements under all BIA action alternatives, would serve to protect Native American and Tribal Interests through reducing impacts on tribally significant values such as water quality, dark skies, and CIMPPs. BIA Alternatives B and C offer the most protection for cultural resources, while BIA Alternative D offers the least protection of the action alternatives.

Lands and Realty

Increased setback regulations for fluid mineral wells would restrict ROW placement and opportunities for siting oil and gas infrastructure under BIA Alternatives A, B, and C.

Social and Economic Uses

Economic output would likely remain across all alternatives as the BIA is not making decisions on mineral allocations. Socioeconomic impacts such as increased costs on operators for mitigation requirements or added utility costs on lessors, through the codification of enforceable regulations at the lease, drilling, and operation stages of development, could occur to varying degrees across all BIA action alternatives.

Public Health and Safety

There would be varying degrees of reduced impacts on human health and safety such as reduced levels of air emissions, noise, light pollution, and traffic across BIA Alternatives A, B, C, and D when compared with the BIA No Action Alternative. Reduced impacts would be accomplished through setback stipulations and required mitigation measures for noise and light pollution.

ES.8 CONSIDERATIONS IN SELECTING A PREFERRED ALTERNATIVE

The proposed alternatives offer a range of discrete strategies for resolving limitations in existing management, exploring opportunities for enhanced management, and addressing issues identified through internal assessment and public scoping. The BLM and BIA fully considered the comments submitted by other government agencies, public organizations, state and Tribal entities, and interested individuals.

The BLM Land Use Planning Handbook (H-1601-1) requires the agency to identify a preferred alternative in the draft FMG RMPA/EIS. The BIA must identify a preferred alternative, if one exists, in the draft RMPA/EIS (40 CFR 1502.14). Formulated by the planning team, the agencies' preferred alternatives represent those goals, objectives, and actions determined to be most effective at resolving planning issues and balancing resource use. Collaboration was critical in developing and evaluating alternatives; however, the final designation of a preferred alternative for the BLM and BIA remains the exclusive responsibility of each agency.

ES.8.1 Recommendations and Resulting Actions

BLM

The BLM Field Manager recommends BLM Alternative C as the preferred alternative. During public review of the draft FMG RMPA/EIS, the BLM is seeking constructive input on the proposals for managing resources and resource uses. After considering these comments, the BLM will develop a Proposed RMPA to be evaluated in the final EIS.

BIA

The BIA Navajo Regional Director recommends BIA Alternative C as the preferred alternative. During public review of the draft FMG RMPA/EIS, the BIA is seeking constructive input on the proposals for managing resources and resource uses. After considering these comments, the BIA will develop a proposed alternative to be evaluated in the final EIS.

ES.9 IMPLEMENTATION AND MONITORING OF THE JOINT BLM AND BIA RMPA/EIS

ES.9.1 BLM

Implementation of the BLM RMPA will begin when the BLM State Office Director signs the Record of Decision (ROD).

Decisions in the RMPA will be tied to the BLM budgeting process. The BLM will develop an implementation schedule to provide for systematic accomplishment of decisions in the approved RMPA.

During RMPA implementation, the BLM will prepare additional documentation for site-specific actions to comply with the National Environmental Policy Act of 1969 (NEPA). This can vary, from a simple statement of conformance with the ROD and adequacy of existing NEPA analysis to more complex documents that analyze several alternatives.

The BLM will monitor and periodically evaluate RMPA implementation, based on guidance in its Land Use Planning Handbook, H-1601-1 (BLM 2005), as amended. Monitoring is the process of tracking and documenting the implementation (or the progress of implementation) of land use plan decisions; evaluation is the process of reviewing the land use plan and the periodic plan monitoring reports. This is done to determine whether the land use plan decisions and NEPA analysis are still valid. The BLM would also review the way in which the plan is being implemented.

As outlined in the BLM's Land Use Planning Handbook, H-1601-1, the RMP will be periodically evaluated, as documented in an evaluation schedule (at a minimum, every 5 years). This is to determine whether revisions or further amendments to the RMP may be necessary to accommodate changes in resource needs, policies, or regulations. Implementation-level decisions would be issued in order to fully implement the RMPA.

ES.9.2 BIA

It is the responsibility of the appropriate Bureau and Tribal line officers to ensure that selected management alternatives are implemented. The agency Superintendent shall be responsible for development of action plans for various programs and activities affected by the selected management alternatives of the EIS. These action plans shall ensure the objectives of the selected management alternatives are properly considered during development of various programs and projects, budget formulation and execution plans, annual work plans, employee performance standards, etc.

Reviews of the decision made in this EIS will be conducted every five years by the agency office. Reviews shall briefly examine current issues, determine the validity of the preferred action, document corrective action where necessary, and record progress of plan implementation.

The Central/Regional Office shall conduct periodic program reviews of the selected management alternatives and their implementation. These program reviews shall provide a means of evaluating Bureau performance in management of trust resources. The objective of the program review is to: 1) determine adequacy of plans; 2) determine if the preferred action has been properly implemented; 3) determine if management resources (funding, staffing, etc.) are sufficient to implement the preferred action; 4) determine if the preferred action is reasonable, in light of Tribal/Bureau program priorities and the competition for limited management resources; and 5) determine the need for changes in Bureau direction, policy and management practices.

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Chapter I. Introduction and Purpose and Need

I.1 INTRODUCTION

The BLM FFO published an EIS and RMP in 2003 to outline management decisions and guidance for the FFO (BLM 2003).

In 2012, the BLM determined it would produce an EIS to examine changes in oil and gas (O/G) development patterns in the Mancos/Gallup formations, including innovations in horizontal drilling technology and multistage hydraulic fracturing. These innovations in new drilling technology have resulted in additional extraction and associated surface disturbance in what was previously considered a fully developed oil and gas field in portions of the FFO. New well technology also allows for increased production from multiple, more-efficient wells from fewer well pads. The BLM FFO began preparing the Mancos-Gallup RMPA and EIS to update management of the lands and mineral estate under its administration in the FFO.

The FMG RMPA/EIS and initial scoping period were announced in an NOI published in the *Federal Register* on February 25, 2014. After the initial scoping period ended in May 2014, the BLM began developing its alternatives and preparing the EIS. In 2016, the BIA NRO became a co-lead agency for the EIS to develop analysis informing BIA leasing decisions related to oil and gas development under its jurisdiction. The BLM and BIA share management responsibilities related to oil and gas development on Navajo Tribal trust and individual Indian allotted lands in the area that is the subject of the FMG RMPA/EIS. Both agencies evaluated scoping comments and further developed alternatives based on issues raised in the second scoping period that ended in February 2017. The NOI announcing that the BIA had joined the project was published in the *Federal Register* on October 21, 2016.

Oil and gas development and other resource programs on BLM-managed lands and federal mineral estate in the planning area are currently managed according to land use decisions set by the following:

- The 2003 Farmington RMP
- The visual resources plan amendment completed in 2014 (BLM 2014a)
- The Glade Run Recreation Area Recreation and Transportation Management Plan, completed in 2015 (BLM 2015a)

As part of its examination of oil and gas leasing and development in the RMPA/EIS, the BLM is also analyzing realty actions, vegetation management, and lands with wilderness characteristics because internal scoping determined that management of these resources also needed to be updated. While the BLM will document its actions in the RMPA, the BIA will use this EIS to document its actions for future oil and gas leasing.

Although the 2003 RMP decision does not apply to lands or minerals administered by the BIA, the 2003 RMP did coordinate resource management actions with the Navajo Nation. The BLM continues to work cooperatively with the Navajo Nation to ensure areas of interest are identified during site-specific consultations at the application for permit to drill (APD) level (BLM 2003).

The memorandum of understanding (MOU) between the BIA, BLM, Office of Natural Resources Revenue, and Office of Surface of Mining was replaced by the Onshore Energy and Mineral Lease Management Interagency Standard Operating Procedures (Interagency SOP) in September 2013. The SOP established

common standards and methods for creating efficient and effective working relationships to achieve the DOI goal of accurate energy and mineral accountability for onshore federal and Tribal leases.

The reaction from Navajo residents and Chapters to the 2003 RMP and the 2014 FMG RMPA/EIS scoping process indicated a desire for the BIA to participate in this EIS. This reaction, coupled with the SOP, provided the opportunity and rationale for the BIA to become a co-lead agency for this RMPA/EIS. As a co-lead agency for the FMG RMPA/EIS, the BIA intends to use this EIS to analyze alternatives and issues related to its authority over mineral leasing and associated activity decisions in the planning area. The BIA has leasing decision-making authority for the Navajo Nation on Tribal trust lands and Navajo Indians on individual Indian allotments (hereinafter referred to as Navajo Tribal trust lands and individual Indian allotments, respectively).

In making leasing and related activity decisions, the BIA coordinates with the BLM and other agencies whose roles are specified in an interagency agreement (BIA et al. 2013). For example, the BIA is responsible for approving and completing NEPA compliance for new leases and assignments on Tribal minerals; the BLM is responsible for approving and completing the NEPA obligations and other compliance actions for APDs. Both agencies work closely with the Federal Indian Minerals Office (FIMO), which assists allottees with all aspects of their mineral interests.

The BLM and BIA are preparing this NEPA analysis in accordance with Secretarial Order 3355, Streamlining National Environmental Policy Act Reviews and Implementation of Executive Order 13807, "Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects."

I.2 PURPOSE OF AND NEED FOR THE BLM AND BIA ACTIONS

I.2.1 Purpose of and Need for the BLM Action

The primary purpose of this planning action is to adapt to changing oil and gas development patterns in the Mancos/Gallup formations under BLM administration, while providing for multiple use and protecting valid existing rights. This will be accomplished by amending the 2003 RMP to analyze the potential impacts on the FFO from oil and gas innovations, including horizontal drilling technology and multistage hydraulic fracturing. These innovations may result in more wells and different surface disturbances and impacts in the FFO than were analyzed in the 2003 RMP. Additionally, this amendment will update the BLM's analysis of realty actions, vegetation management, and identify lands with wilderness characteristics in the FFO.

In addition to other related laws, rules and regulations, the need for planning is established by BLM requirements and authority under the following:

- NEPA
- Mineral Leasing Act of 1920 as amended (MLA)
- Mining and Minerals Policy Act of 1970
- Federal Land Policy and Management Act of 1976 (FLPMA)
- National Materials, Minerals, Policy, Research, and Development Act of 1980
- Federal Onshore Oil and Gas Leasing Reform Act of 1987
- BLM Land Use and Planning Handbook (H-1601-1) (2005)
- BLM Manual 6320

I.2.2 Purpose of and Need for BIA Action

The purpose of the FMG RMPA/EIS is to develop leasing stipulations and other oil and gas development criteria through the EIS process. The BIA will use these to guide the management of oil and gas trust resources owned by the Navajo Nation and individual Indian allottees in response to potential impacts on the Navajo communities in the planning area due to changing oil and gas development patterns in the

Mancos/Gallup formations; examples are horizontal drilling technology and multistage hydraulic fracturing, along with associated development activities. This includes addressing the surface, subsurface mineral, and split-estate for Tribal trust and individual Indian allotments in the planning area, while developing BIA and FIMO leasing stipulations that maximize the mineral owner's best economic interest and that minimize any adverse environmental or cultural impacts resulting from such development, in accordance with 25 CFR 211. The BLM's RMPA applies solely to BLM-managed lands.

In addition to other related laws, rules, and regulations, the need for the FMG RMPA/EIS is established by BIA requirements and authority under the following:

- NEPA
- MLA
- Mining and Minerals Policy Act of 1970
- Indian MLA of 1938 (25 US Code [USC] 396a-g)
- Indian Mineral Development Act of 1982 (25 USC 2101 et seq.)
- 25 Code of Federal Regulations (CFR) 169 (25 USC 323)
- BIA Fluid Mineral Estate Procedural Handbook (2012a)

I.3 DESCRIPTION OF THE PLANNING AREA AND DECISION AREAS

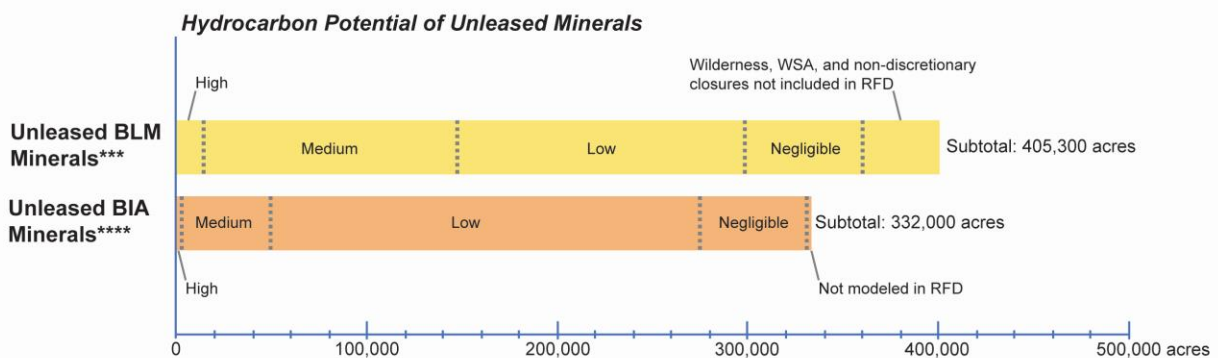
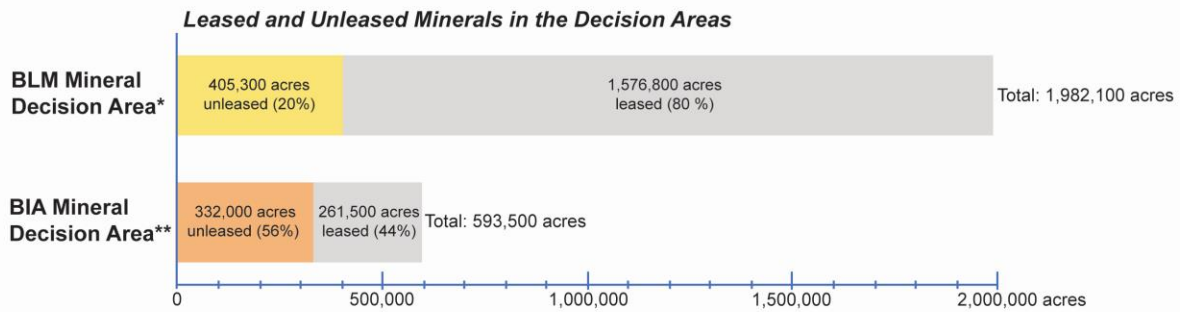
The planning area consists of a portion of the FFO and NRO in San Juan, Rio Arriba, McKinley, and Sandoval Counties. It encompasses 4,189,460 acres, including lands managed by the BLM, the BIA (Tribal trust lands and individual Indian allotments), the State of New Mexico, the Forest Service, the National Park Service, the Bureau of Reclamation, and New Mexico Game and Fish; it also includes private property and Navajo Tribal fee lands. A map of the planning area (**Figure I-1, Planning Area**) is included in **Appendix A**, which includes all full-page figures. Because landownership in the southern portion of the planning area is generally made up of smaller isolated parcels under different ownership, it is often referred to as a checkerboard (see the southern portion of the planning area in **Figure I-1; Appendix A**).

Population centers—Farmington, Aztec, and Bloomfield—are generally in the northern portion of the planning area. Smaller communities, such as Lybrook, Counselor, Huerfano, Ojo Encino, and Nageezi, are along the US Highway 550 corridor, and Pueblo Pintado and Torreon/Star Lake are in the southern area of the planning area. Cuba, Gallup, Crownpoint, and Shiprock, also population centers in the FFO, fall outside the planning area (see **Figure I-1; Appendix A, Planning Area**). Almost all the planning area has a population where more than half of the population identifies as a minority race, and most of the area has greater levels of individuals that live below the poverty line. Additionally, Native Americans account for a substantial portion of the study area population, including McKinley County, where the population is nearly three-quarters American Indian (see **Section 3.6.3, Environmental Justice**).

In total, between the administrative authority of the BLM and the BIA, the decision areas are approximately 62 percent of the planning area. The decision areas represent the areas where the BLM's and BIA's actions analyzed in the FMG RMPA/EIS would apply.

Much of the mineral estate in the decision area (the area where the BLM or the BIA, or both have administrative authority) is already leased. Approximately 1.8 million acres are covered by approximately 2,270 active leases, including 2,300 leases on BLM-managed minerals and 560 leases on BIA-managed minerals (**Figure I-2, Leased and Unleased Acreage in the Mineral Decision Areas**).

**Figure I-2
Leased and Unleased Acreage in the Mineral Decision Areas**



Source BLM geographic information systems (GIS) 2017

*See Section 1.3.1, BLM Decision Area for an explanation of the BLM mineral decision area

**See Section 1.3.2, BIA Decision Area for an explanation of the BIA mineral decision area

***Unleased minerals in the BLM mineral decision area

****Unleased minerals in the BIA mineral decision area

Most existing active leases have approved APDs (**Figure I-3; Appendix A, Existing Oil and Gas Leases and Approved APDs**). Existing leases would not be subject to new stipulations, but new stipulations would apply to areas where previously issued leases have expired. Similarly, already approved APDs would not be subject to COAs analyzed in the FMG RMPA/EIS; however, new or extensively modified APDs on existing leases could be subject to new COAs, and new leases would be subject to the stipulations outlined in the FMG RMPA/EIS and adopted by the BLM and BIA.

1.3.1 BLM Decision Area

The BLM decision area for the FMG RMPA/EIS is only the surface land and subsurface mineral estate in the planning area over which the BLM has authority to make land use and management decisions. This includes some subsurface mineral estate underlying Navajo Tribal trust surface lands in the decision area.

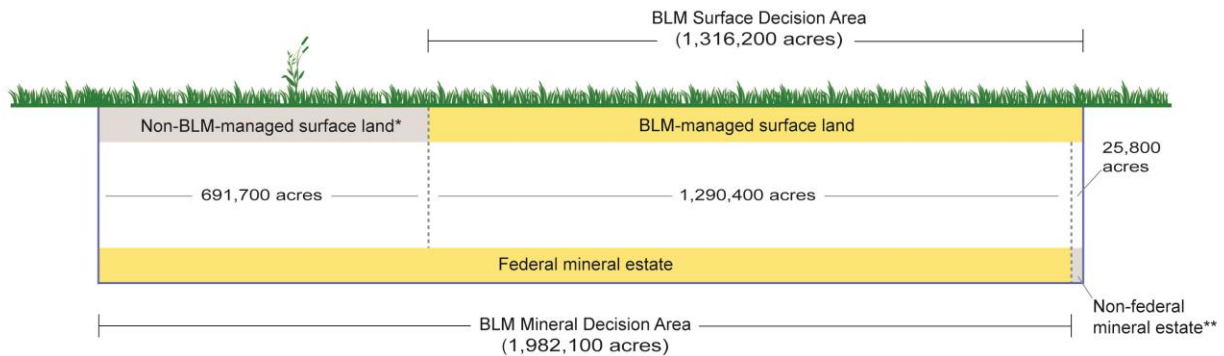
The total BLM decision area is made up of approximately 2 million acres of BLM-managed surface lands and federal mineral estate. In some portions of the planning area, the BLM administers the surface lands, while another entity owns the mineral estate; in other areas, the BLM administers federal mineral estate, while another entity owns and manages the surface lands. This can happen as a result of land exchanges that did not include mineral transfers or other related trades or acquisitions.

Because of these areas where the surface and minerals are owned or managed by two different entities, there are two different decision areas for the BLM in the FMG RMPA/EIS. The BLM surface decision area includes all surface land that it manages. Some of the minerals beneath this surface land are administered by the BLM, and some are owned by other entities. The BLM mineral decision area includes federal mineral estate managed by the BLM. The BLM manages some of the surface land above this federal mineral estate, and other entities own or administer some of it.

The Forest Service determines the stipulations for the lands it manages; because of this, those lands and the federal minerals beneath them are not part of the BLM surface or mineral decision area for the FMG RMPA/EIS. Similarly, NPS lands and the minerals beneath them are withdrawn from mineral entry and are not part of the BLM surface or mineral decision area for the FMG RMPA/EIS (see **Chapter 2, Alternatives**).

Figure I-4, BLM Surface and Mineral Decision Areas, illustrates acreage and differences in the two decision areas for the BLM. The yellow portions of the surface land indicate the BLM-managed surface decision area; the yellow portions of the subsurface mineral estate show the BLM subsurface decision area. **Figure I-5; Appendix A, BLM Decision Area**, also provides a map of the total BLM decision area and the acreage of each type of surface or mineral estate within it.

**Figure I-4
BLM Surface and Mineral Decision Areas**



Source: BLM GIS 2020

*Non-BLM-managed surface land includes private and New Mexico State Land Office lands, as well as Navajo Tribal trust managed by the BIA manages.

No decisions will be made under the draft FMG RMPA/EIS for BLM-managed lands in the FFO that are outside the decision area. This is because these lands are not affected by the changing technologies described in **Section 1.2.1, Purpose of and Need for BLM Action**. Those lands will continue to be managed in accordance with the 2003 RMP.

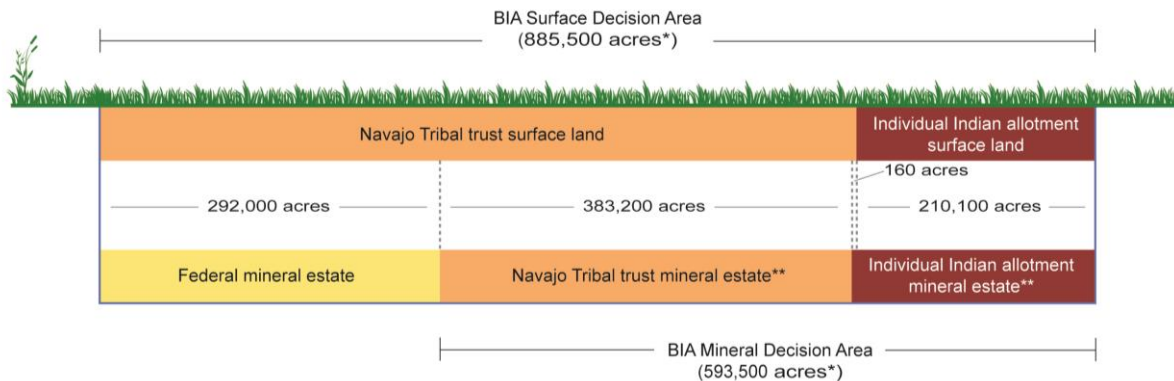
1.3.2 BIA Decision Area

The BIA decision area includes approximately 900,000 surface and mineral estate acres divided between Navajo Tribal trust and individual Indian allotments for which the BIA NRO has authority to make decisions regarding mineral leasing and associated activities. Tribal trust lands of the Jicarilla Apache Nation and the Ute Mountain Ute Tribe are part of the planning area because they are adjacent to or “checkerboarded” among BLM-managed lands and federal mineral estate, but they are not part of the BIA NRO decision area for this RMPA/EIS. They were included in the planning area as part of the larger analysis prepared for the RFD scenario due to being part of the Mancos/Gallup formations and due to the BLM’s and BIA’s trust responsibility to the Jicarilla Apache Nation and the Ute Mountain Ute Tribe.

In the planning area, all individual Indian allotment surface lands are above individual Indian allotment minerals. However, as described for the BLM decision area, Navajo Tribal trust surface lands do not always include subsurface mineral rights. In some cases, these remain as federal mineral estate or the mineral estate of individual Indian allottees; therefore, there are also two different decision areas for the BIA considered in the FMG RMPA/EIS. The BIA surface decision area includes all Navajo Tribal trust and individual Indian allotment surface land. Some of the minerals beneath this surface land are Navajo Tribal trust and individual Indian allotment minerals, and some (beneath Navajo Tribal trust surface land) are administered by the BLM.

The BIA mineral decision area includes all Navajo Tribal trust and individual Indian allotment mineral estate. All of the surface land above the BIA mineral decision area is also Navajo Tribal trust or individual Indian allotment. **Figure I-6**, Example BIA Surface and Mineral Decision Areas, illustrates the differences in the two decision areas for the BIA. The brown and orange portions of the surface land indicate the BIA surface decision area; the brown and orange portions of the subsurface mineral estate show the BIA subsurface decision area. **Figure I-7; Appendix A**, BIA Decision Area, also provides a map of the total BIA decision area and the acreage of each type of surface or mineral estate in it. In addition, the BLM approves APDs for all federal mineral development, including those for leases under BIA authority (see **Figure I-4**, BLM Surface and Mineral Decision Areas).

Figure I-6
Example BIA Surface and Mineral Decision Areas



Source: BLM GIS 2020

*Rounded to the nearest hundred.

**The BLM has permitting authority for oil and gas development on Navajo Tribal trust and individual Indian allotment subsurface mineral estate.

Navajo Tribal fee lands cover 170,800 acres in the planning area but are not included in the BIA surface or mineral decision areas. Lease stipulations developed in the FMG RMPA/EIS would not apply to Navajo Tribal fee lands as neither the BLM nor the BIA has leasing management authority on Navajo Tribal fee lands.

I.4 PLANNING PROCESS

I.4.1 Planning for the BLM

The process for amending the 2003 RMP began under the authority of Section 202 of FLPMA and Section 102 of NEPA. The process is guided by BLM planning regulations (43 CFR 1600) and the Council on Environmental Quality (CEQ) regulations (40 CFR 1500). The FFO is amending the 2003 RMP in accordance with 43 CFR 1610.5-5 to incorporate new data and changed circumstances. The process for amending the RMP has two types of decisions: land use planning-level decisions and implementation-level

decisions. **Table I-1** illustrates the differences between the BLM and BIA decision-making processes for fluid mineral development from planning to implementation.

**Table I-1
Similarities and Differences in BLM and BIA Decision-making Processes for Fluid Mineral Development**

Decision Level		BLM		BIA	
		Decision	Analysis	Decision	Analysis
PLANNING-LEVEL DECISIONS		RMP: Leasing allocations (open, closed, controlled surface use); goals and objectives for managing oil and gas resources and associated exploration and development activities; resource allocations; no ground disturbance.	NEPA completed at a broad scale; very speculative with respect to project activity. Often is completed as an EIS.	BIA NRO does not use a RMP or equivalent planning document, therefore the analysis in this EIS will facilitate decisions to guide future leasing and project-level decisions.	NEPA completed at a broad scale; very speculative with respect to project activity. Often is completed as an EIS.
IMPLEMENTATION-LEVEL DECISIONS	<i>LEASING DECISIONS</i>	More definitive than RMP, but broader in scope than a project-level decision. Details on well locations or other facilities are generally not known.	NEPA is more localized and less speculative. Often is completed as an EA.	More definitive than EIS, but broader in scope than a project-level decision. Decision is dependent on whether lease is for Navajo Tribal trust lands or individual Indian allotments. Details on well locations or other facilities are generally not known.	NEPA is more localized and less speculative. Often is completed as an EA.
	<i>PROJECT-SPECIFIC DECISIONS</i>	BLM is responsible for reviewing and approving Application for Permit to Drill (APD) that provides the site-specific detail of O/G developer's proposal, including the type of development that will occur under all or a portion of the O/G lease. A documented project decision allows the wells to be drilled and completed with site-specific mitigation and COAs.	A NEPA document (often completed as an EA) presents effects analysis for localized or site-specific effects from the proposed well(s). Analysis takes COAs and proposed mitigation into account when making decisions.	BIA does not process APDs ¹ ; however, the BIA does provide COAs to the BLM to incorporate into their decision on an APD. This includes when the surface and mineral estate is managed by the BLM, as well as instances of split estate.	Not applicable

¹ Per the interagency standard operating procedure (ISOP), the BLM is responsible for processing APDs—a project-level decision for oil and gas development.

Decisions in land use plans guide future land management actions and subsequent site-specific implementation decisions. Planning-level decisions are broadly stated; the BLM describes the overarching desired future condition of the resource, including goals and objectives, and the allocations and management actions needed to achieve those goals and objectives. Appendix C of the BLM Land Use Planning Handbook (H-1601-1) describes planning decisions for each resource and use program that it is charged with managing (see also BLM H-1601-1, pp. 12–14).

Implementation decisions generally constitute the BLM's final approval allowing on-the-ground actions to proceed; they require appropriate site-specific planning and NEPA analysis and are subject to various administrative remedies, such as appeals to the Interior Board of Land Appeals. For example, approving an APD is considered an implementation decision, because it would allow an operator to begin construction

of a well as soon as the APD is issued (see BLM H-1601-1, pp. 29–31 and Appendix C). Implementation-level decisions include both leasing and site-specific decisions

As part of the FMG RMPA/EIS, the BLM is making only planning-level decisions; the approved RMPA/Record of Decision (ROD) will not include leasing or site-specific level decisions. Planning-level decisions the BLM is considering as part of the FMG RMPA/EIS are the following:

- Developing new goals, objectives, allocations, and management actions for vegetation management and lands with wilderness characteristics
- Changes to the goals, objectives, allocations, and management actions for the oil and gas program, including consideration of areas open or closed to leasing and new or modified stipulations, including NSO, CSU, and TLs
- Changes to the goals, objectives, allocations, and management actions for the Lands and Realty Program, including considering avoidance and exclusion areas, along with stipulations that could be applied to ROW grants

In accordance with 43 CFR 1610.4, amendment of an RMP involves interrelated steps, as illustrated in **Table I-1**.

Some implementation-level actions that the BLM may apply in the future are described in this RMPA for informational purposes, but no decisions are being made on those actions. For example, the BLM may describe in the alternatives any COAs that it may apply to site-specific APDs. When an existing lessee on BLM-managed federal mineral estate submits an APD, the BLM conducts an additional analysis of the site-specific conditions on the lease and where the facilities are proposed. Based on this analysis, the BLM may apply COAs to protect sensitive resources at the site. While COAs may add restrictions on development of an existing lease, they must not eliminate the operator's lease rights.

I.4.2 Planning for the BIA

Unlike the BLM, which is proposing to amend its 2003 RMP, the BIA does not intend to modify a resource plan or other planning document as a result of the FMG RMPA/EIS process. The EIS will identify specific BIA and FIMO stipulations for inclusion in oil and gas leases; it also will show a range of COAs for potential adoption by the BLM in the APD phase of oil and gas development, as determined appropriate per undertaking.

As a part of its trust responsibility to enhance the quality of life and promote economic opportunity of American Indians, Indian Tribes, and Alaska Natives, the BIA manages mineral resources on both Navajo Tribal trust lands and individual Indian allotments. The Navajo Nation negotiates and consents to operating agreements for oil and gas development per the Indian Mineral Development Act of 1982, which allows for Tribes to use other agreements for minerals instead of the standard BIA leases. The BIA Navajo Regional Director has the delegated responsibility for managing oil and gas operations on individual Indian allotted mineral estate through the leasing process. The lease authorizes the exploration for, extraction of, or removal of any minerals (25 C.F.R. 211.3). Managing responsibilities include, but are not limited to the following:

- Approving oil and gas mining leases (or operating agreements)
- Offering proposed leasing for bidding
- Ensuring the Indian mineral owner provides consent
- Approving of cooperative unit, drilling or other development plan on any lease (or operating agreement) area upon determination that the approval is advisable and in the best interest of the Indian mineral owner
- Appraising damage and collecting compensation for damages

- Monitoring overall lease (or operating agreement) operations to ensure that lessees do not cause surface or subsurface pollution
- Ensuring that lessees (or operators) carry out operations in a prudent manner

In the FMG RMPA/EIS process, the BIA will follow the guidelines in its NEPA Guidebook 59 IAM 3-H (DECRM 2012), and its planning process is illustrated in **Table I-2**. While the draft and final FMG RMPA/EIS will contain both the BLM and BIA analysis in one document, the BIA and BLM will sign two separate RODs.

Table I-2
BLM and BIA Planning Process

Planning Process Step	Description
Step 1—Prepare preparation plan	A proper preparation plan provides the foundation for the entire planning process.
Step 2—Analyze the management situation (BLM only)	Assess the current management of resources in the planning area (BLM only).
Step 3—Issue NOI to prepare the RMPA/EIS and start scoping	Notify the public, Native American Tribes, other federal agencies, and state and local governments about the agency's intent to engage in land use planning for the FMG RMPA/EIS.
Step 4—Conduct scoping	Identify issues and concerns through a scoping process that includes the public, Native American Tribes, other federal agencies, and state and local governments.
Step 5—Formulate alternatives	Develop a range of reasonable management alternative to address issues identified during scoping.
Step 6—Analyze effects of alternatives	Estimate the effects of each alternative.
Step 7—Select a preferred alternative	Identify the alternative that best resolves planning issues as the preferred alternative.
Step 8—Prepare a draft RMPA/draft EIS	Prepare this document to describe the purpose of and need for the FMG RMPA/EIS, the alternatives for managing lands in the planning area (including the preferred alternative), the affected environment, the environmental impacts of those alternatives, and the consultation and coordination that the agency engaged in while developing the FMG RMPA/EIS.
Step 9—Publish Notice of Availability	Provide a 90-day public comment period.
Step 10—Prepare a proposed RMPA/final EIS	After comments on the draft document have been received and analyzed, modify it as necessary.
Step 11—Publish Notice of Availability	Provide a 30-day public protest period.
Step 12—Provide a consistency review period	Provide a 60-day consistency review period for the New Mexico Governor (BLM only) or the Navajo Nation President (BIA only), concurrent with the 30-day public protest period.
Step 13—Prepare RODs and approved RMPA	The BLM and BIA each sign a ROD to approve the FMG RMPA/EIS.
Step 14—Implement, monitor, and evaluate plan decisions	Implement management measures outlined in the approved plan and monitor them to test their effectiveness. Make changes as necessary to achieve desired results.

Source: BLM 2005

Similar to the Governor's consistency review, the Navajo Nation President will have 60 days to identify inconsistencies between the proposed plan and Navajo Nation plans and programs and to provide written comments to the BIA NRO Director before the ROD is signed.

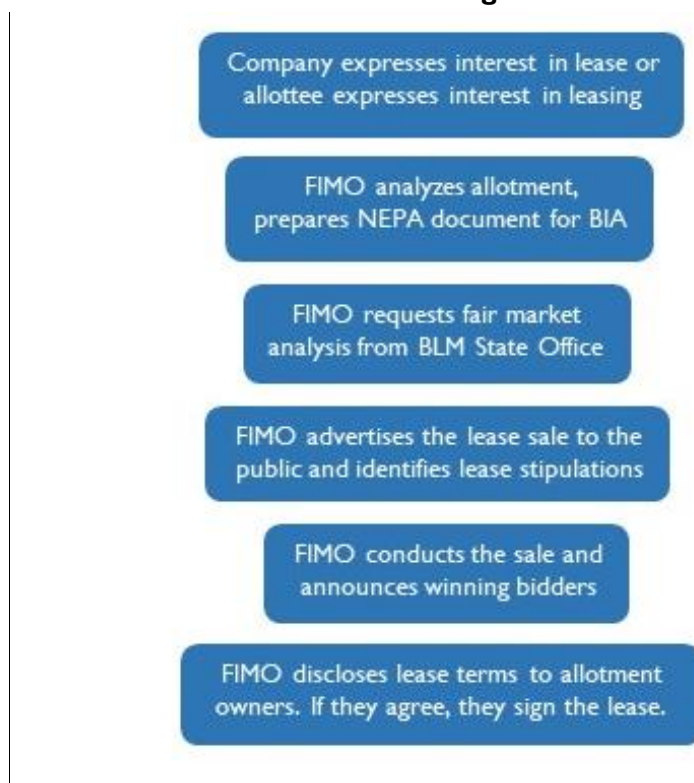
The full responsibilities of the BLM, BIA, and other federal agencies regarding Indian onshore oil and gas leasing and development are set out in the Interagency SOP (BIA 2013). The BIA is responsible for leasing Tribal trust and individual Indian allotted minerals and permitting off-lease ROWs across Tribal trust properties and allotted lands; the BLM is responsible for approving APDs and overseeing reclamation after the oil and gas operation is complete.

The FIMO may provide COAs for the BLM to apply to APDs; however, the BIA maintains final decision-making authority for leases, and the BLM maintains final decision-making authority for APDs through the interagency standard operating procedure (ISOP). These roles and responsibilities can be changed, if warranted, through an MOU between the agencies.

The FIMO is an umbrella office that includes personnel from the BLM, BIA, Office of Natural Resources Revenue, and Office of Special Trustee for American Indians. The FIMO in Farmington provides Indian Trust services to Indian allottees in managing their oil and gas mineral resources under a memorandum of agreement (MOA; BIA et al. 2017). The FIMO consolidates and integrates Indian allotted oil and gas management functions under one line of authority. It provides customer service for allottees regarding all aspects of their mineral interests.

Operators interested in leasing Indian oil and gas allotments work through the FIMO, which analyzes the operator requests, coordinates with the affected allottees, negotiates or holds competitive lease sales, administers the leases, and ensures that royalties are paid (see **Figure I-8**, FIMO Process for Leasing Allotted Minerals). FIMO also works with the BLM to determine what COAs will be applied to APDs on allotted mineral leases. The FIMO has no role in leasing on Tribal trust lands.

Figure I-8
FIMO Process for Leasing Allotted Minerals



I.5 SCOPING AND PLANNING ISSUES

In accordance with BLM, BIA, and CEQ policies and guidance, the BLM and BIA are providing opportunities for the public, various groups, other federal agencies, Tribes, Tribal members, and state and local governments to participate meaningfully and substantively and to give input and to comment during the preparation of the FMG RMPA/EIS. For the purpose of the FMG RMPA/EIS, unless otherwise specified, “Tribe” refers to all federally recognized Native American Tribes, which includes Pueblos. **Chapter 4, Consultation and Coordination**, describes this collaboration.

I.5.1 Public Scoping

There were two public scoping periods for the FMG RMPA/EIS, the details of which can be found in the two scoping reports (BLM 2014b; BLM 2017). The first, in early 2014, offered the public an opportunity to comment on planning criteria and issues related to the BLM’s process. After the BIA became a co-lead agency for the FMG RMPA/EIS, a second round of public scoping was conducted, from October 2016 through February 2017. The purpose of this scoping process was to seek public input on issues and planning criteria specifically related to the analysis of BIA mineral leasing and associated activity decisions to be considered in the FMG RMPA/EIS. This 2016/2017 scoping did not, however, reopen the issues and planning criteria related to the BLM’s decisions to be considered in the EIS. Members of the public, particularly Navajo residents and Chapters, raised additional issues regarding the impacts of oil and gas development on other resources. Also, as a part of this issue identification process, the BLM and BIA sought input from cooperating agencies and affected Tribes (see **Section 4.3**, Native American Tribal Consultation, and **Section 4.4**, Cooperating Agency Coordination). Based on scoping input and the difference in the two agencies’ missions, some actions proposed in the alternatives differ for each agency.

I.5.2 Planning Issues

Planning issues are “disputes or controversies” about existing and potential land and resource allocations, levels of resource use, production, and related management practices (BLM Land Use Planning Handbook H-1601-1; BLM 2005). These issues are the focus of alternatives development. A detailed description of the planning issues identified for analysis during public scoping and those issues that will not be analyzed in the FMG RMPA/EIS can be found in the scoping reports from the two public scoping periods (BLM 2014b; BLM 2017). Key planning issues for this RMPA/EIS are the following:

- Issue 1. Oil and Gas Development
 - How would the BLM and BIA manage fluid mineral leasing, including the level of allowed development, stipulations, and mitigation measures, to fulfill the BLM and BIA’s individual missions while addressing impacts on other resources given the predicted increase in development and the use of hydraulic fracturing technology?
 - How should the BLM and BIA address split-estate parcels?
 - How would the BLM and BIA manage leasing and development on Tribal allotted lands?
- Issue 2. Lands and Realty
 - Given expected increased demand for ROWs to support growing oil and gas development, should any ROW corridors be designated in the planning area? If so, where should they be located?
 - How should ROWs be managed in the planning area to protect other resources?
- Issue 3. BLM Lands with Wilderness Characteristics
 - Do lands with wilderness characteristics exist in the planning area? If so, should they be managed to protect those characteristics?
 - What management actions should the BLM apply to protect lands being managed for wilderness characteristics?

- How would the BLM assess and manage for lands with wilderness characteristics in the planning area?
- Issue 4. Vegetation Management
 - How should the BLM and BIA maintain or restore healthy landscapes to address the anticipated increase in oil and gas development?
 - How should the BLM and BIA maintain or restore wildlife habitat to address the anticipated increase in oil and gas development?
 - How should the BLM and BIA maintain or restore special status species habitat to address the anticipated increase in oil and gas development?
 - How would the BLM and BIA maintain or restore healthy river corridors and minimize and otherwise mitigate invasive weed spread in the planning area?
 - How would the BLM and BIA mitigate development impacts on vegetation given its importance to wildlife and traditional uses?
 - How would the BLM and BIA mitigate impacts on upland and riparian areas while balancing traditional uses of the land?

1.6 PLANNING CRITERIA

During the original scoping process in 2014 (see **Section 1.5.1**), the BLM developed planning criteria to establish constraints, guidelines, and standards for the planning process. Planning criteria help planners define the scope of the amendment process and estimate the extent of data collection and analysis necessary. Alternatives not satisfying the planning criteria are eliminated from consideration.

Planning criteria are based on standards prescribed by applicable laws and regulations, agency guidance, analysis of information pertinent to the planning area, the results of consultation and coordination with the public and other federal, Tribal, state, and local agencies, and professional judgment. The planning criteria originally identified by the BLM can be found in NOI published in the *Federal Register* on February 25, 2014 (https://eplanning.blm.gov/epl-front-office/projects/lup/68107/86637/103808/2014-04051_FRN.pdf).

The BLM and BIA presented additional planning criteria in the October 21, 2016, NOI for public scoping (https://eplanning.blm.gov/epl-front-office/projects/lup/68107/87709/104965/2016-25527_FRN_Amended_NOI_10212016.pdf). These criteria reflected the BIA's new role as co-lead agency for the EIS. The BLM and BIA may change planning criteria due to public input, as issues are addressed, or as new information is presented.

1.7 COLLABORATION

The BLM and BIA are engaging in ongoing collaboration with federal, Tribal, state, and local governments as part of this planning process. This collaboration includes government-to-government consultation with affected Native American Tribes, the participation of cooperating agencies, and consultation with regulatory agencies, as required by law. **Chapter 4, Consultation and Coordination**, provides more information about the involvement of these stakeholders.

1.8 RELATED LAND USE PLANS

The BLM's planning regulations require that its RMPs be consistent with officially approved or adopted land use-related plans of other federal, Tribal, state, and local governments. The RMPs must be consistent with the purposes, policies, and programs of federal laws and regulations applicable to public lands. Guidance for the BIA is similar for EISs.

The agencies must acknowledge any possible conflicts between the proposed actions and federal, Tribal, state, and local land use plans. When developing the FMG RMPA/EIS, the BLM and BIA reviewed plans formulated by federal, Tribal, state, and local governments that relate to managing lands and resources.

Plans consulted in the preparation of the draft FMG RMPA/EIS can be found in **Appendix N**, References; Related Land Use Plans; and Laws, Regulations, and Agency Guidance.

I.9 POLICY AND OVERALL VISION

I.9.1 Policy

The BLM is responsible for the management of public lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based on “multiple use” principles—a combination of uses that account for the long-term needs of future generations for renewable and nonrenewable resources. These resources include minerals, recreation, watersheds, vegetation communities, public health and safety, fish and wildlife, wilderness, and natural, scenic, scientific, and cultural values.

The FMG RMPA/EIS provides an updated assessment of resources, uses, conditions, and trends; a forum for enhanced public collaboration and involvement; and a comprehensive impact analysis of reasonable management alternatives and resulting land use decisions.

After the BLM ROD is signed, the FMG RMPA/EIS would replace that portion of the 2003 RMP relevant to the BLM’s decisions to be made (see **Section 1.4**, Planning Process). The BIA’s management actions will be outlined in its ROD, which the agency will use to guide the management of oil and gas trust resources owned by the Navajo Nation and individual Indian allottees. Although the BIA is not modifying any resource or other plan, its decision would follow the BIA NEPA Guidebook 59 IAM 3-H (DECRM 2012).

The management actions considered in the FMG RMPA/EIS are designed to comply with Executive Order 13783, Promoting Energy Independence and Economic Growth (82 FR 16093-16097), and Executive Order 13790, Promoting Agriculture and Rural Prosperity in America (82 FR 20237-20239), as well as other relevant policy and guidance, as listed in **Appendix N**.

I.9.2 Overall Vision

The overall vision for BLM-managed lands for the FMG RMPA/EIS is derived from public scoping, interagency dialogue, and the BLM’s interdisciplinary team: Facilitate development of federal mineral resources while improving natural, cultural, and open space values across the landscape to protect human health and the environment, and pursue recreation opportunities through partnerships and collaboration for the enjoyment and use of the growing and diverse population and future generations.

The BIA’s vision for the FMG RMPA/EIS process is oil and gas development in the region, consistent with its overall mission, which is as follows: Enhance the quality of life, promote economic opportunity, and carry out the responsibility to protect and improve the trust assets of American Indians, Indian Tribes, and Alaska Natives.

The management actions considered in the FMG RMPA/EIS are designed to comply with Executive Order 13783, Promoting Energy Independence and Economic Growth (82 FR 16093-16097), and Executive Order 13790, Promoting Agriculture and Rural Prosperity in America (82 FR 20237-20239), as well as other relevant policy and guidance, as listed in **Appendix N**.

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Chapter 2. Alternatives

This chapter details the alternatives being considered by the BLM and BIA for the draft FMG RMPA/EIS. It includes references to maps (in **Appendix A**, Figures), identifying where actions would be applicable.

The BLM and BIA formulated the proposed alternatives in response to issues and concerns identified through two rounds of public scoping. This chapter summarizes the process wherein alternatives were considered, eliminated from further consideration, or carried forward for analysis in the FMG RMPA/EIS. The alternatives considered in detail are intended to resolve limitations with current management strategies and to explore opportunities for enhanced management of resources and resource uses. The range of alternatives for each agency includes a No Action Alternative and four action alternatives, Alternatives A through D.

Decision Areas for the FMG RMPA/EIS

The goals, objectives, management actions, and allowable uses considered in this chapter would apply only to the BLM or BIA surface or mineral decision areas. These areas are defined further in **Section 1.3**, Description of the Planning Area and Decision Areas.

Management or Withdrawal by Other Federal Agencies

The BLM is the agency responsible for administering leases and developing the federal mineral estate under the MLA of 1920, as amended. The agency adopts the leasing requirements and accompanying stipulations determined by other federal surface-managing agencies when leasing the mineral estate, including the Forest Service, BOR, and NPS.

Procedures for leasing fluid minerals beneath Forest Service, BOR, and NPS surface lands vary to some degree but generally involve consent and/or consultation with the appropriate agency before leasing; however, no Forest Service, BOR, or NPS lands or the fluid minerals beneath them are a part of the decision area for the FMG RMPA/EIS.

2.1 INTRODUCTION TO THE FMG RMPA/EIS ALTERNATIVES

The BLM FMG RMPA/EIS decisions consist of identifying and clearly defining goals and objectives (desired outcomes) for resources and resource uses. The decisions also pertain to allowable uses and management actions necessary for achieving the goals and objectives. These determinations guide future land management actions and subsequent site-specific implementation actions. Their purpose is to meet multiple use and sustained yield mandates, while sustaining land health. Similarly, the BIA FMG RMPA/EIS decisions identify actions to achieve the BIA's management responsibility in alignment with the agency's mission statement, while considering the Navajo Nation's self-governance.

Purpose of Alternatives Development

Alternatives development is the heart of the FMG RMPA/EIS process. Land use planning and NEPA regulations require the BLM and BIA to formulate a range of reasonable alternatives. Established planning criteria, as outlined in 43 CFR 1610, guide the alternatives development process.

In accordance with NEPA regulations, the FMG RMPA/EIS must “[r]igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated” (40 CFR 1502.14[a]). It also must consider reasonable alternatives that are not within the jurisdiction of the lead agency (40 CFR 1502.14[c]). The NEPA regulations at 40 CFR 1501.2(c), state that federal agencies shall “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts

concerning alternative uses of available resources.” This pursuit provides the BLM, the BIA, and the public with an understanding of the diverse ways in which conflicts over resources and resource uses might be resolved. It also offers the BLM State Director and BIA Regional Director a range of reasonable alternatives from which to make informed decisions. The components and broad aim of each alternative considered for the FMG RMPA/EIS are discussed below.

2.2 ALTERNATIVES DEVELOPMENT PROCESS FOR THE FMG RMPA/EIS

The BLM and BIA planning team used their respective planning processes (outlined in **Chapter 1, Table I-3, BLM and BIA Planning Process**) to develop a range of reasonable alternatives for the FMG RMPA/EIS. The steps in this process involved frequent reexamination following periods of public and staff review.

2.2.1 Identify Planning Issues

The BLM and BIA planning teams developed four preliminary planning issues to be addressed in the FMG RMPA/EIS: oil and gas development, lands and realty, BLM-managed lands with wilderness characteristics, and vegetation management (see **Section 1.5.2, Planning Issues**).

The BLM and BIA considered planning issues raised internally and externally during alternatives development and identified stipulations and mitigation measures to address them. The issues also were addressed through oil and gas allocations, such as closing lands to leasing or restricting leasing in sensitive locations.

2.2.2 Analyze the Management Situation

BLM and BIA resource specialists assessed existing RMP goals, objectives, and actions, along with current BIA policy, in relation to measurement tools, such as land health assessments, human impact studies, biological assessments, NEPA actions, and fuels monitoring data. They did this to gauge successes and limitations in addressing the planning issues. In March 2015, the BLM compiled a detailed assessment and released the FMG RMPA Assessment of the Management Situation. It provided information useful to the agencies for the following:

- Summarizing existing conditions
- Explaining the need for change
- Identifying management opportunities

2.2.3 Develop a Range of Reasonable Alternatives

Between September 2014 and August 2017, the BLM and BIA planning teams met to develop management goals; small teams met to identify objectives and actions to address the goals in their fields of expertise. The various groups met numerous times throughout this period to refine their work. They developed separate alternatives for the BLM RMPA/EIS and the BIA EIS concurrently. Cooperating agencies were invited to attend and participate in some of these meetings.

Both agencies developed one no action alternative and four action alternatives. The action alternatives for each agency were designed to accomplish the following:

- Address the four planning issues
- Fulfill the purpose of and need for the FMG RMPA/EIS (outlined in **Section 1.2, Purpose of and Need for the RMPA and EIS**)
- Meet the BLM’s multiple use mandates of FLPMA (43 USC 1716)
- Achieve the BIA’s mission to enhance quality of life, promote economic opportunity, and protect and improve trust assets

2.3 ALTERNATIVES CONSIDERED FOR DETAILED ANALYSIS

The resulting action alternatives—A, B, C, and D—for both the BLM and BIA offer a range of possible management approaches for responding to the planning issues. While the goals are often the same across alternatives, each alternative contains a discrete set of objectives and management actions, each constituting a separate possible BLM RMPA or BIA management program. Each alternative addresses resource program goals in varying degrees, with the potential for different long-range outcomes and conditions.

The relative emphasis given to particular resources and resource uses also differs, including allowable uses, mitigation measures, and specific direction pertaining to individual resource programs. When resources or resource uses are mandated by law or are not tied to planning issues, there are typically few or no distinctions between alternatives.

Table 2-1, Comparative Summary of BLM Alternatives (Acres)¹, compares the differences in allocations among the five alternatives. **Table 2-2**, Description of BLM No Action Alternative and Alternatives A, B, C, and D, describes the proposed decisions for each BLM alternative. It includes goals, objectives, management actions, and allowable uses for individual resource programs. The figures in **Appendix A** provide a visual representation of differences between alternatives.

In instances where varying management levels overlap, the stricter management prescriptions would apply by default. If the BLM Authorized Officer makes an exception, modification, or waiver to the stricter prescription, then the less strict management would still apply. The overlap is preserved to allow this layering of management in the cases where the stricter management prescription is excepted, modified, or waived. For example, if an area were subject to both NSO and CSU stipulations, the NSO stipulation would apply by default. If the NSO stipulation were waived based on the waiver criteria for the stipulation, the CSU stipulation would still be applied. The area would not revert to having no stipulations unless both the NSO and CSU stipulations were waived.

Table 2-3, Description of BIA No Action Alternative and Alternatives A, B, C, and D, describes the proposed decisions for each BIA alternative. The figures in **Appendix A** provide a visual representation of differences between alternatives.

Unlike those of the BLM, the suite of alternatives developed by the BIA does not include acreage allocations because of the complex process for leasing on Indian lands. They incorporate themes and federal responsibilities that are common to both agencies but include elements that reflect the unique mission of the BIA and features of Tribal self-government.

GIS data have been used to perform acreage calculations and to generate the figures in **Appendix A**. Calculations depend on the quality and availability of data, and most calculations in the FMG RMPA/EIS are rounded to the nearest 100 acres. Given the scale of the analysis, the compatibility constraints between datasets, and lack of data for some resources, all calculations are approximate and serve for comparison only. Likewise, the figures in **Appendix A** are provided for illustrative purposes and are subject to the limitations discussed above. The BLM and BIA may receive additional or updated data, so acreages may be recalculated and revised at a later date through plan maintenance.

2.3.1 Management Common to All Alternatives

Certain allowable uses and management actions from the 2003 RMP are relevant to the four planning issues addressed in the FMG RMPA/EIS and remain valid; therefore, they do not require revision. They have been carried forward in the No Action Alternative and Alternatives A, B, C, and D. Other decisions are common only to the action alternatives, Alternatives A, B, C, and D.

Although each alternative is distinct in the resources and resource uses it emphasizes, all five do the following:

- Provide for development of the oil and gas resources in the Mancos/Gallup formations and the rest of the BLM and BIA mineral decision areas
- Comply with federal, Tribal, and state laws, regulations, policies, and standards, including the FLPMA multiple use and sustained yield mandates
- Comply with the ISOP
- In accordance with the ISOP, the BLM performs a drainage review on Indian lands and advises the BIA of any potential drainage situation
- Comply with applicable planning criteria described in **Section 1.6**, Planning Criteria
- Implement actions originating from laws, regulations, and policies and conform to day-to-day management, monitoring, and administrative functions not specifically addressed
- Preserve valid existing rights, such as any leases, claims, or other use authorizations established before a new or modified authorization, change in land designation, or new or modified regulation is approved
- Consider applying COAs, BMPs (shown in **Appendix B**, BLM and BIA BMPs, and **Appendix C**, Conditions of Approval), and other site-specific mitigation measures to all resource uses to promote rapid reclamation, maximize resource protection, and minimize soil erosion
- Provide for adjustment of setbacks as needed based on site-specific conditions, such as multiple wells on a single pad
- Avoid, to the extent possible, impacts whenever cultural sites are found at project locations through consultation with the New Mexico State Historic Preservation Officer (SHPO), Navajo Nation THPO, and Native American Tribes
- Seek to enhance collaborative opportunities, partnerships, and communications with other agencies and interested parties to implement the FMG RMPA/EIS, including education and outreach and project-specific activities
- Apply the exceptions, modifications, and waivers for fluid mineral leasing stipulations outlined in **Appendix D**, Restrictions Applicable to BLM Fluid Mineral Leasing, unless otherwise stated under a specific action
- Apply stipulations required by other surface management agencies to BLM-managed federal mineral estate beneath surface managed by those other agencies (see **Appendix D**).
- Identify and apply exclusion and other mitigation measures and conservation actions in order to achieve land use plan goals and objectives
- Use the best available data

In addition to the shared elements above, **Table 2-2** and **Table 2-3** indicate management actions common to all five alternatives by using a single cell across the table row.

The sequence of mitigation actions will follow the hierarchy identified at 40 CFR 1508.20 (avoid, minimize, rectify, reduce or eliminate over time, or compensate).

In addition to existing federal, Tribal, and state regulations, the following existing stipulations are incorporated by reference into all BIA alternatives, except where **Table 2-3** indicates a proposed change:

- BIA Surface Management Stipulations
- US Department of the Interior (USDOI) BIA Oil & Gas Mining Lease Allotment Indian Lands
- FIMO Exhibit A, Special Provisions
- FIMO Exhibit B, Oil & Gas Leasing Administrative Function Guidelines for Cultural Resources Compliance

- Navajo Nation Surface Management Stipulations
- Navajo Nation Department of Fish and Wildlife (NNDFW), Biological Resource Land Use Clearance Policies and Procedures (RCS-44-08)
- NNDFW, Navajo Natural Heritage Program, Endangered Species List Species Accounts

All measures considered by the BIA in **Table 2-3** would apply to both Navajo Tribal trust and individual Indian allotment lands and minerals, unless otherwise noted. Additional information on the purpose and rationale behind the measures in the BIA alternatives can be found in **Appendix E**, Restrictions Applicable to Bureau of Indian Affairs Fluid Mineral Leasing: Purpose.

2.3.2 BLM Alternatives Summary

No Action Alternative

This required alternative continues the current management direction and prevailing conditions derived from existing planning documents. Goals and objectives for resources and resource uses addressed in the FMG RMPA/EIS are based on the applicable portions of the 2003 RMP (BLM 2003), along with associated amendments, activity and implementation level plans, and other management decision documents. Laws, regulations, and BLM policies that supersede RMP decisions would apply.

The goals and objectives for BLM-managed surface lands and federal mineral estate would not change. Appropriate and allowable uses and restrictions pertaining to such activities as mineral leasing and development, vegetation management, lands with wilderness characteristics, and LUAs would also remain the same. The BLM would not modify existing or establish additional criteria to guide the identification of site-specific use levels for implementation. Accordingly, the No Action Alternative does not apply any stipulations or closures around the CCNHP boundary or Chacoan roads and outliers.

BLM Alternative A

This alternative focuses on managing and enhancing habitats in the BLM decision area. It emphasizes enhancing ecological systems and maintaining or improving the resiliency of ecosystems. To achieve this desired future condition, Alternative A integrates adaptive management and prioritizes natural and nonrenewable resource programs. Goals and objectives focus on environmental outcomes achieved by sustaining relatively unmodified physical landscapes and natural resource values.

This alternative would establish the greatest number and extent of specific measures designed to support natural ecosystems. Vegetation communities would be managed to create a diverse and resilient ecosystem. The BLM would manage all lands with wilderness characteristics to protect those characteristics as a priority over other multiple uses. Appropriate and allowable uses and restrictions placed on fluid mineral leasing and LUAs would focus on minimizing impacts on natural resources.

In addition, the BLM would close to leasing a 2-mile zone around the CCNHP boundary and would apply an NSO stipulation from miles 2 through 4 outside of the CCNHP boundary.

BLM Alternative B

This alternative (and its sub-alternatives) emphasizes to a differing degree the preservation and protection of the Chacoan and cultural landscapes unique to northern New Mexico. Management priority under this alternative is given to protecting cultural properties and paleontological resources. Management direction would recognize and expand existing uses and would accommodate new uses, consistent with protecting the Chacoan and cultural landscapes in the BLM decision area. The BLM would manage all lands with wilderness characteristics to protect those characteristics as a priority over other multiple uses. Vegetation communities would be managed to enhance the unique landscapes, while sustaining and increasing native vegetation communities.

The appropriate development scenarios for allowable uses (such as mineral leasing and ROWs) would emphasize protection of the natural and cultural landscape and associated viewshed and soundscape. Appropriate and allowable uses and restrictions would emphasize social and cultural resources, while mitigating impacts on land health.

A citizen-proposed alternative forms portions of Alternative B, including a suite of measures designed to maximize protection of the Chacoan landscape. These measures are based on proposals from various stakeholders between 2010 and 2019, including participating Tribes and Pueblos, The Wilderness Society, the National Trust for Historic Preservation, the Chaco Alliance, and the San Juan Citizens Alliance.

These stakeholders expressed concerns about impacts of oil and gas development on CCNHP; its entrance road; the Great North Road, which includes the North Road Area of Critical Environmental Concern (ACEC); and other Chacoan sites. Specific impact concerns relate to viewsheds and night skies, noise, recreation experience, air quality, water quality, lands with wilderness characteristics, and traditional cultural properties (TCPs). They requested that the BLM prepare a master leasing plan for the greater Chaco landscape. While the BLM no longer uses master leasing plans, many of the specific measures these stakeholders suggested, such as phased leasing and a 10-mile restriction zone around the CCNHP boundary, have been incorporated into the sub-alternatives.

The sub-alternatives for BLM Alternative B apply only to oil and gas leasing management around the CCNHP boundary, specifically leasing closures or NSO stipulations, as follows:

- BLM Sub-Alternative B1—Closed to fluid mineral leasing from miles 0 to 10 around the CCNHP boundary. This 10-mile closure would include the Chacoan outliers of Pueblo Pintado and Kin Bineola.
- BLM Sub-Alternative B2—Closed to fluid mineral leasing from miles 0 to 15 around the CCNHP boundary. This 15-mile closure would include the Chacoan outliers of Pueblo Pintado and Kin Bineola.

BLM Alternative C

This alternative (and its six sub-alternatives) focuses on a strategy that balances community needs and development, while enhancing land health. It places a particular emphasis on the Tribal and local perspective of the landscape and facilitates resource development, while minimizing impacts on the traditional, historical, socioeconomic, and cultural lifeways of the planning area. Goals and objectives focus on socioeconomics, human health and environment, cultural uses, communities, recreation opportunities, and tourism.

The BLM would emphasize other multiple uses as a priority over protecting wilderness characteristics in all units of lands with wilderness characteristics. Vegetation communities would be managed to facilitate traditional and historical uses of the vegetation, while allowing for resource development. The appropriate development scenarios for allowable uses would emphasize resource use without disrupting surrounding communities.

The sub-alternatives for BLM Alternative C apply only to oil and gas leasing management around the CCNHP boundary, specifically leasing closures or NSO stipulations, as follows:

- BLM Sub-Alternative C1—NSO stipulation from miles 0 to 2 around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola
- BLM Sub-Alternative C2—NSO stipulation from miles 0 to 4 around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola

- BLM Sub-Alternative C3—NSO stipulation from miles 0 to 6 around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola
- BLM Sub-Alternative C4—NSO stipulation from miles 0 to 8 around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola
- BLM Sub-Alternative C5—NSO stipulation from miles 0 to 10 around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola
- BLM Sub-Alternative C6—Closed to fluid mineral leasing from miles 0 to 4 around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola and an NSO stipulation from miles 4 to 6 around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola

BLM Alternative D

This alternative focuses on maximizing resources that target economic outcomes, while sustaining land health. Management direction would promote development of fluid mineral resources and would accommodate new uses to the greatest extent possible. The BLM would emphasize other multiple uses as a priority over protecting wilderness characteristics in all units of lands with wilderness characteristics. Vegetation communities would be managed to sustain healthy conditions and to promote commercial development.

The appropriate development scenarios for allowable uses would emphasize maximizing resource production, while maintaining the basic protection needed to sustain resources. Appropriate and allowable uses and restrictions would emphasize social and economic outcomes, while mitigating impacts on land health. The BLM would acknowledge that there are likely to be more adverse effects on historic properties associated with the Chacoan landscape under this alternative even with avoidance, minimization, and mitigation under Section 106 of the National Historic Preservation Act (54 USC 306108 [NHPA]).

Similar to the No Action Alternative, the BLM would apply no closures or stipulations to the areas around the CCNHP boundary or Chacoan roads and outliers.

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**Table 2-1
Comparative Summary of BLM Alternatives (Acres)¹**

Resource or Resource Use	Alternatives				
Resources	No Action	A	B	C	D
Vegetation Treatments²	–	<i>Figure 2-1</i>	<i>Figure 2-2</i>	<i>Figure 2-3</i>	
Priority level 1	0	497,100	286,100	1,289,800	
Priority level 2	0	403,100	614,100	25,800	
Priority level 3	0	415,400	415,400	0	
Total	0	1,315,600	1,315,600	1,315,600	
Plant Conservation Areas (PCAs)	–	<i>Figure 2-4</i>		–	
Plant conservation areas	0	6,800		0	
Lands Managed to Protect Wilderness Characteristics as a Priority Over Other Multiple Uses	<i>Figure 2-5</i>	<i>Figure 2-6</i>		<i>Figure 2-5</i>	
Unit 069	0	5,900		0	
Unit 075	0	8,300		0	
Unit 082	0	10,100		0	
Total	0	24,300		0	

Resource or Resource Use	Alternatives											
Resource Uses	No Action	A	B1	B2	C1	C2	C3	C4	C5	C6	D	
Fluid Mineral Allocation	<i>Figure 2-7</i>	<i>Figure 2-8</i>	<i>Figure 2-9</i>	<i>Figure 2-10</i>	<i>Figure 2-11</i>						<i>Figure 2-12</i>	<i>Figure 2-13</i>
Closed to fluid mineral leasing	109,100	543,500	726,500	825,700	109,100						153,800	109,100
Closed to leasing—BLM-managed surface/federal fluid minerals	96,300	397,900	494,700	571,300	96,300						110,300	96,300
Closed to leasing—Non-BLM surface/federal fluid minerals	12,800	145,600	231,800	254,400	12,800						43,500	12,800
Open to fluid mineral leasing	1,873,000	1,438,600	1,255,600	1,156,400	1,873,000						1,828,300	1,873,000
Open to leasing—BLM-managed surface/federal fluid minerals	1,194,100	892,500	795,700	719,100	1,194,100						1,180,200	1,194,100
Open to leasing—Non-BLM surface/federal fluid minerals	678,900	546,100	459,900	437,300	678,900						648,100	678,900
Fluid Mineral Allocation												
Open to leasing, subject to standard terms and conditions	737,700	241,000	188,500	185,600	685,000	661,100	633,900	597,500	558,100	633,900	769,200	
Open to leasing, subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations)—BLM surface/federal fluid minerals	331,000	87,500	64,300	63,200	280,400	271,700	260,900	240,800	217,400	260,900	343,400	
Open to leasing, subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations)—Non-BLM surface/federal fluid minerals	406,700	153,500	124,200	122,400	404,600	389,400	373,000	356,700	340,700	373,000	425,800	
Fluid Mineral Allocation	<i>Figure 2-14</i>	<i>Figure 2-15</i>	<i>Figure 2-16</i>	<i>Figure 2-17</i>	<i>Figure 2-18</i>	<i>Figure 2-19</i>	<i>Figure 2-20</i>	<i>Figure 2-21</i>	<i>Figure 2-22</i>	<i>Figure 2-23</i>	<i>Figure 2-24</i>	
Open to leasing, subject to NSO	83,800	1,037,500	588,900	548,000	133,900	161,300	195,300	240,900	295,800	156,700	41,300	
Open to leasing subject to NSO—BLM surface/federal fluid minerals	62,200	681,300	426,500	398,100	81,800	91,600	105,600	131,500	168,200	92,500	38,000	
Open to leasing, subject to NSO—Non-BLM surface/federal fluid minerals	21,600	356,200	162,400	149,900	52,100	69,700	89,700	109,400	127,600	64,200	3,300	

Resource or Resource Use	Alternatives											
	No Action	A	B1	B2	C1	C2	C3	C4	C5	C6	D	
Fluid Mineral Allocation	<i>Figure 2-25</i>	<i>Figure 2-26</i>	<i>Figure 2-27</i>	<i>Figure 2-28</i>	<i>Figure 2-29</i>						<i>Figure 2-30</i>	<i>Figure 2-31</i>
Open to leasing, subject to CSU	1,112,600	702,700	900,300	833,000	1,141,400						1,131,800	1,093,300
Open to leasing, subject to CSU—BLM surface/federal fluid minerals	846,100	554,100	645,200	590,200	891,700						888,900	841,200
Open to leasing, subject to CSU—Non-BLM surface/federal fluid minerals	266,500	148,600	255,100	242,800	249,700						242,900	252,100
Fluid Mineral Allocation	<i>Figure 2-32</i>	<i>Figure 2-33</i>	<i>Figure 2-34</i>	<i>Figure 2-35</i>	<i>Figure 2-36</i>						<i>Figure 2-37</i>	
Open to leasing, subject to TLs	316,300	317,400	129,900	123,300	316,300						3,700	
Open to leasing, subject to TLs—BLM surface/federal fluid minerals	256,900	281,400	121,100	115,600	256,900						1,500	
Open to leasing, subject to TLs—Non-BLM surface/federal fluid minerals	59,400	36,000	8,800	7,700	59,400						2,200	
Lands and Realty	-	<i>Figure 2-38</i>	<i>Figure 2-39</i>		<i>Figure 2-40</i>							
ROW exclusion areas	0	28,800	24,800		2,800							
ROW avoidance areas	0	1,060,400	956,100		5,900							
Open to ROW authorization	1,316,200	226,600	334,800		1,307,200							
Utility corridors	<i>Figure 2-41</i>	<i>Figure 2-42</i>	<i>Figure 2-43</i>									
	25,000	104,000	127,000									
Identified for exchange	-	<i>Figure 2-44</i>										
	0	3,400										

Source: BLM GIS 2020 Appendix A (Figures)

¹ Because fluid mineral allocations and other actions may overlap, they cannot be summed to equal the total BLM decision area.

² Treatments would be implemented across the FFO; priority levels would serve as a guide to direct which areas receive treatments first, based on available resources.

2.3.3 BIA Alternatives Summary

No Action Alternative

In accordance with the Indian Affairs National Environmental Policy Act Guidebook (59 IAM 3-H; BIA 2012), the BIA is required to consider a no action alternative, which would continue current management, or business as usual. The BIA No Action Alternative would continue present management direction from practices contained in existing laws, regulations, policies, and standards.

BIA Alternative A (Protect and Enhance Natural Ecology)

BIA Alternative A focuses on protecting and enhancing natural environments, while emphasizing the protection of sensitive wildlife areas and ecological resources. This alternative would establish the greatest number and extent of specific measures to protect or enhance resource values. Appropriate and allowable uses and restrictions would focus on minimizing impacts on natural resources.

BIA Alternative B (Preserve and Protect Cultural and Natural Landscape)

BIA Alternative B emphasizes the preservation and protection of the cultural and natural landscapes unique to northern New Mexico. Management priority under this alternative is given to protecting cultural resources, such as CCNHP and other TCPs. The appropriate development scenarios for allowable uses (such as mineral leasing) would emphasize protecting the natural and cultural landscape and associated viewshed and soundscape. Appropriate and allowable uses and restrictions would emphasize avoiding, minimizing, or otherwise mitigating impacts on natural, social, and cultural resources.

BIA Alternative C (Traditional, Historic, Socioeconomic, and Cultural Lifeways)

BIA Alternative C focuses on allowing development to occur in harmony with the traditional, historical, socioeconomic, and cultural lifeways of the planning area. This alternative emphasizes in particular the Tribal and local perspective of the landscape and traditional lifeways. At the same time, it prioritizes management with the fewest impacts on human communities from oil and gas development, such as increased traffic and crime or decreased human health, air, and water quality.

BIA Alternative D (Maximize Resource Production in an Environmentally Responsible Manner)

BIA Alternative D focuses on making the most of resources that target economic outcomes, while protecting land health. Management direction would promote development of fluid mineral resources and would accommodate new uses to the greatest extent possible. The appropriate development scenarios for allowable uses would emphasize maximizing resource production and royalty income for the landowners—both Navajo Nation and individual Indian allottees—while avoiding, minimizing, or otherwise mitigating impacts in surrounding communities.

2.3.4 Environmental Consequences

In **Chapter 4**, Environmental Consequences, the proposed uses and restrictions were analyzed to determine where actions for one resource might cause indirect impacts on another resource not expressly described in this chapter. A summary of the environmental consequences of each alternative for the BLM and BIA is included in **Appendix F**, Summary Comparison of Environmental Consequences.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

2.4.1 Prohibit Fluid Mineral Leasing Throughout the Decision Areas

All of the BLM alternatives propose closing areas to fluid mineral leasing. This is based on policy or legislation, or when the BLM has determined that resource values could not be adequately protected, even with restrictive lease stipulations. Resource values that can be protected only by prohibiting all fluid mineral leasing throughout the BLM mineral decision area have not been identified. A BLM or BIA alternative that prohibits fluid mineral leasing throughout the decision area would not meet either agency's purpose of and need for the FMG RMPA/EIS (detailed in **Section 1.2**).

Leasing stipulations and conditions of approval are developed by the BLM and BIA to mitigate expected impacts, while making natural resources available for development and ensuring protection of sensitive resources. Oil and gas leases are prohibited from being issued for certain specially designated areas (SDAs), such as designated Wilderness; other areas are designated as open to fluid mineral leasing only under a no surface occupancy stipulation to ensure the protection of surface resources.

Development is not guaranteed to take place on lands open to fluid mineral leasing under any given alternative. It is BLM policy to make lands open to fluid mineral leasing where those leases can be developed in an environmentally acceptable manner and where the lands are not excluded from leasing by some other policy, regulation, or law.

Leasing is part of the multiple use mandate provided for in the management of the public lands under FLPMA. Under the MLA of 1920, the BLM applies the least restrictive management constraints necessary to achieve resource goals and objectives for uses of public lands. The BLM stipulations and conditions of approval (available in **Appendices C and D**) help ensure that oil and gas development will be compatible with other uses of the land.

The BIA has a trust responsibility to facilitate the leasing and development of oil and gas resources held in trust by the United States for the benefit of Tribal interests, which includes individual Indian allottees.

The BIA considered an alternative under which it would not approve any new leases, but it eliminated this alternative from further analysis. While lease approval or denial is within the BIA's authority, this alternative would not meet the purpose of and need for the BIA action. The alternative poses conflicts with the BIA's trust responsibility to facilitate the leasing and development of oil and gas resources held by the United States in trust. Royalties from oil and gas development are an important source of revenue for the Tribes and individual Indian allottees.

2.4.2 Close all Navajo Tribal Trust Surface over Federal Mineral Estate to New Leasing

Resource values that could be protected only by prohibiting all fluid mineral leasing on Navajo Tribal trust surface lands over federal mineral estate have not been identified.

Federal mineral estate beneath Navajo Tribal trust surface lands cannot as a whole be protected at a higher level or treated differently than federal mineral estate beneath individual Indian allotted surface or privately owned surface under existing law and BLM Onshore Order No. 1. The BLM must comply with NEPA, the NHPA, and related federal statutes when authorizing lease operations on split-estate lands, where the surface is not federally owned but the oil and gas resources are federally owned.

For federal fluid minerals accessed via Navajo Tribal trust surface, the Navajo Nation is entitled to surface use fees and damages for impacts on surface use. Surface disturbance on Navajo Tribal trust surface when accessing federal oil and gas resources is subject to applicable regulations.

2.4.3 Modify Federal Oil and Gas Royalty Revenue Sharing to Directly Benefit Affected Navajo Nation Chapters

During the alternatives development process, the BLM considered an alternative proposal to modify federal royalty revenue sharing from oil and gas development. This would ensure that royalties from developing federal mineral estate within Navajo Nation chapter boundaries would be directed to mitigate the effects of that development on Navajo communities.

NEPA does not require agencies to consider in detail unreasonable alternatives outside the jurisdiction of those agencies. An alternative may be unreasonable when it is not viable or is remote or speculative. An alternative like this one is of remote and speculative feasibility because it could be implemented only after significant changes in government policy and legislation.

Dispersal of federal royalty revenues for oil and gas is controlled by the Mineral Leasing Act of 1920, as amended (41 Stat. 437). As set out in the act, royalties from oil and gas extraction on federal mineral estate are paid to the US Treasury. Under the act, the revenue from these royalties is then split between the US Treasury and the state where the extraction occurs. To change the Mineral Leasing Act's dispersal of royalty revenues, Congress would have to amend the act. Because this amendment involves the states' revenues earned from federal royalties, this amendment would not be without debate. An alternative analyzing such a fundamental change in statute and policy depends on significantly altering existing law and policy with debate and potential litigation; therefore, it is of speculative feasibility.

In addition, due to the time and protracted debate that would likely be required for the legislative amendment, this alternative is not meaningfully compatible with the time frame of the needs to which the underlying proposal is addressed: mitigating impacts of ongoing and future oil and gas development on Navajo communities.

For these reasons, this alternative was eliminated from further consideration; however, the BLM and BIA will work to develop additional mitigation strategies independently of the FMG RMPA/EIS process, such as an MOU, MOA, or similar solutions.

2.4.4 Limit Injection Wells

During alternatives development, the BLM and BIA considered limiting injection wells in the mineral decision areas; however, the US Environmental Protection Agency (EPA), or Tribes or state with primacy, has primary responsibility for permitting and regulating injection wells under the Safe Drinking Water Act. Because limitations on injection wells are not within the BLM's or BIA's authority, this alternative was eliminated from detailed consideration.

2.4.5 Navajo Eastern Agency Management Zone

During the RMPA/EIS development, the Counselor, Ojo Encino, and Torreon/Star Lake Chapters (Tri-Chapters) of the Navajo Nation proposed a Navajo Eastern Agency Management Zone (NEAMZ). This proposal was to cover roughly 2,500 square miles across 10 Navajo Nation chapters, mostly in the area of northwest New Mexico known as the checkerboard, where land status is complex and variable. The concept of NEAMZ was to streamline management and tenure. Surface lands and minerals would be distributed across various agencies and owners, such as the BLM, Navajo Tribal trust, individual Indian allotments, New Mexico State Land Office, and private landowners. At the same time, the NEAMZ would address development needs for the local communities with deficits in infrastructure, economy, and public services.

Developing a co-management area is beyond the scope of this BIA and BLM undertaking, given the separate goals and management guidelines and objectives for each agency. Local governance authority gives specific jurisdiction in each Navajo chapter to that chapter entity. Other Navajo chapters have authority only as certified through the Navajo Nation Local Governance Act, 26 NNC. The Tri-Chapters' proposal would require significant alterations to the Navajo governmental relationships set forth by these restrictions and thus would necessitate changes to governmental policy or legislation to implement. Such changes are dependent on subsequent additional debate through the Navajo Nation and are therefore speculative at this time.

Also, some of the goals of the Tri-Chapters' proposal may be met through existing alternatives, such as BLM Alternative C. It provides for NSO stipulations within 0.7 miles of houses, barns, other structures and sensitive receptors and exceeds the NSO stipulation proposed by the Tri-Chapters.

Additionally, BIA Alternatives A, B, and C provide for NSO stipulations on Tribal trust and individual Indian allotments within 0.25 miles of a home site lease, house, barn, occupied dwelling, or building units,

which meets the goals proposed by the Tri-Chapters; therefore, this alternative was eliminated from detailed consideration.

2.5 CONSIDERATIONS IN SELECTING A PREFERRED ALTERNATIVE

The proposed alternatives offer a range of discrete strategies for resolving limitations in existing management, exploring opportunities for enhanced management, and addressing issues identified through internal assessment and public scoping. The BLM and BIA considered the comments submitted by other government agencies, public organizations, state and Tribal entities, and interested individuals.

The BLM Land Use Planning Handbook (H-1601-1; BLM 2005) requires the agency to identify a preferred alternative in the draft FMG RMPA/EIS. The BIA must identify a preferred alternative, if one exists, in the draft FMG RMPA/EIS (40 CFR 1502.14). Formulated by the planning team, the agencies' preferred alternatives represent those goals, objectives, and actions determined to be most effective at resolving planning issues and balancing resource use. Collaboration was critical in developing and evaluating alternatives; however, the final designation of a preferred alternative for the BLM and BIA remains the exclusive responsibility of each agency.

2.5.1 Recommendation and Resulting Actions

BLM

The BLM Field Manager recommends BLM Alternative C as the preferred alternative. During public review of the draft FMG RMPA/EIS, the BLM is seeking constructive input on the proposals for managing resources and resource uses. After considering these comments, the BLM will develop a Proposed RMP to be evaluated in the Final EIS.

BIA

The BIA Navajo Regional Director recommends BIA Alternative C as the preferred alternative. During public review of the draft FMG RMPA/EIS, the BIA is seeking constructive input on the proposals for managing resources and resource uses. After considering these comments, the BIA will develop a proposed alternative to be evaluated in the Final EIS.

2.6 MANAGEMENT GUIDANCE FOR BLM AND BIA NO ACTION ALTERNATIVE AND ALTERNATIVES A, B, C, AND D

Table 2-2 is a description of all BLM decisions proposed for each alternative, including goals and objectives. **Table 2-3** is a description of all BIA decisions proposed for each alternative. All decisions in these tables are at the planning level, with the exception of some decisions that are at the implementation level; these will be identified in the proposed RMPA/Final EIS.

Acreages for alternatives and stipulations in this chapter are calculated based on current information. They may be adjusted in the future through BLM RMP maintenance, as conditions warrant.

Valid Existing Rights

All management direction and actions developed as part of the planning process are subject to valid existing rights: all lease, permit, patent, ROWs, and other land use rights or authorizations in effect on the date that the FMG RMPA/EIS is approved. For example, existing ROWs for water lines, power transmission lines, roads, and communication sites will remain valid; these facilities will continue to be operated and maintained as described in the terms and conditions of their specific ROW grants. In all instances, stipulations proposed under BLM and BIA Alternatives A, B, C, and D would apply only to new fluid mineral leases. New stipulations from the FMG RMPA/EIS would not apply to existing leases; however, the BLM has the ability to develop COAs for applications for APDs on either federal mineral estate or Tribal trust or allotted mineral estate. These COAs are meant to achieve the resource objectives of the FMG RMPA/EIS (see the BLM's Land Use Planning Handbook H-1601-1 at Appendix C).

This would happen in cases when the COAs are determined to be reasonable and consistent with valid existing rights.¹ Site-specific NEPA analyses may be needed to justify these COAs.

Stipulations

The BLM can apply three types of stipulations to fluid mineral leasing: NSO, CSU, and TL. These stipulations are defined in detail in **Appendix D**, Restrictions Applicable to Bureau of Land Management Fluid Mineral Leasing. The BIA can also apply stipulations to fluid mineral leasing, in accordance with 25 CFR 211 (Tribal trust minerals) and Part 212 (individual Indian allotment minerals).

Modifications, Exceptions, and Waivers

Lease terms and stipulations (43 CFR 3101.1-4) in an oil and gas lease can be modified, excepted, or waived. This would be the case if the BLM 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.

Modifying, making exceptions to, or waiving stipulations and restrictions would provide a viable and effective means of applying adaptive management techniques to developing fluid mineral leases (See **Appendix D** for more information on waivers, exceptions, and modifications associated with specific BLM stipulations.).

2.6.1 How to Read Tables 2-2 and 2-3

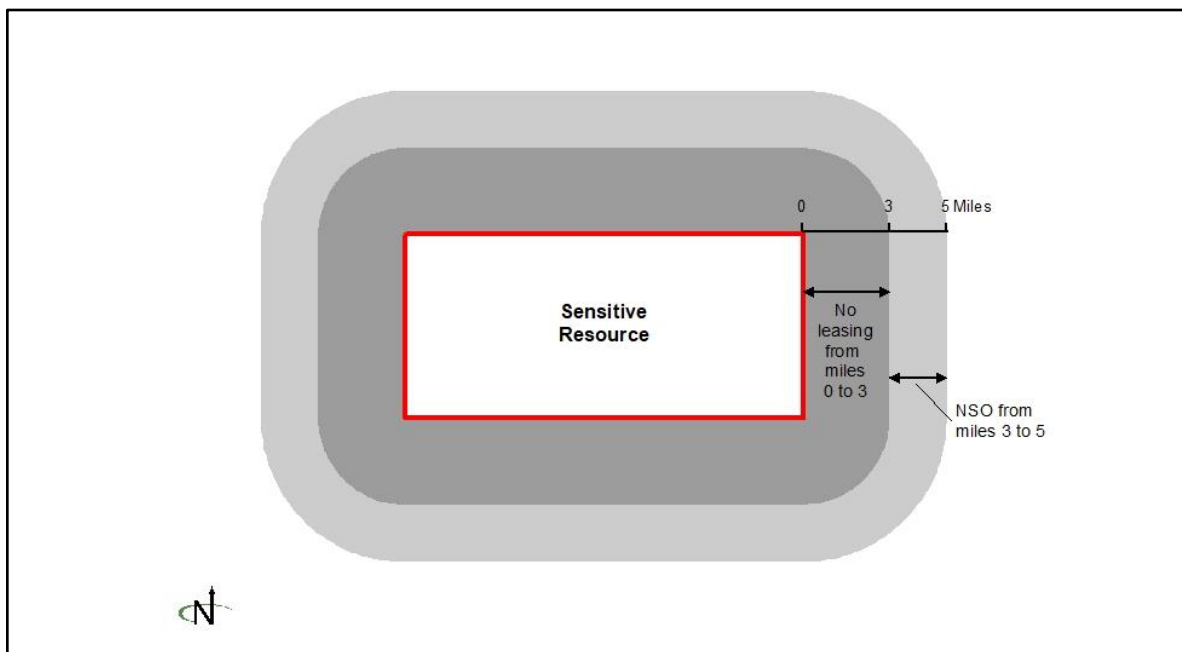
The following describes how **Tables 2-2** and **2-3** are written and formatted to show the BLM or BIA decisions proposed for each alternative. Refer to the diagram below for an example of how to read these tables (with example text included). For goals, allocations, objectives, and actions under the No Action Alternative in **Table 2-2**, the 2003 RMP refers to the existing BLM RMP, and ROD refers to the Record of Decision.

- In accordance with Appendix C of BLM Land Use Planning Handbook H-1601-1, land use plan decisions are broad scale; they guide future land management actions and subsequent site-specific implementation decisions. RMP decisions fall into two categories, desired outcomes (goals and objectives) and allowable uses (including restricted and prohibited) and actions anticipated to achieve the desired outcomes.
 - Goals (BLM only) are broad, aspirational statements of desired outcomes and management direction that usually are not quantifiable or meant to be permanently binding. Goals typically apply to the entire planning area and to all alternatives.
 - Objectives (BLM only) identify aspirational, desired outcomes for either the entire planning area as a whole or to certain geographic areas or resources. Objectives may be consistent across alternatives or vary by alternative. They may be quantifiable and measurable and may have aspirational time frames for achievement. However, they are not meant to be permanently binding; desired outcomes for resources may not prove attainable or successful.
 - Actions are proactive measures or criteria to attempt to achieve desired outcomes, including actions to maintain, restore, or improve land health.

¹See also 43 CFR 1610.5-3(b): "...the Field Manager shall take appropriate measures, subject to valid existing rights, to make operations and activities under existing permits, contracts, cooperative agreements or other instruments for occupancy and use, conform to the approved plan or amendment within a reasonable period of time."

- Allowable uses (BLM only) identify uses or allocations that are allowable, restricted, or prohibited on BLM-managed lands and federal mineral estate to achieve the BLM’s aspirational goals and objectives.
- Stipulations (BLM only; NSO, CSU, and TL), which fall under the allowable uses category, are also applied to BLM fluid mineral leases to achieve desired objectives.
- Actions that are applicable to all alternatives are shown in one cell across a row. These particular objectives and actions would be implemented regardless of which alternative is ultimately selected.
- Actions that are applicable to more than one but not all alternatives are indicated by either combining cells for the same alternatives or by denoting those objectives or actions as, for example, “same as Alternative B.”
- Certain stipulations refer to mileage around sensitive resources. An example is where no leasing should occur from miles 0 to 3 around a sensitive resource, and NSO stipulations should apply within miles 3 to 5. **Figure 2-45**, Example of Mileage Usage in Stipulations, demonstrates how a narrative description of mileage in this stipulation example works in a spatial context.

Figure 2-45
Example of Mileage Usage in Stipulations



Note: This figure demonstrates how certain restrictions in the BLM alternatives may build on one another. It is not an actual illustration of the restrictions that would be applied. Stipulations would not apply to minerals that are not under BLM management.

**Diagram 2-1
How to Read Table 2-2**

Line #	No Action Alternative <i>Current Management</i>	Alternative A <i>Support Natural Ecosystems</i>	Alternative B <i>Preserve and Protect Chacoan and Cultural Landscapes</i>	Alternative C <i>Balance Community Needs and Development</i>	Alternative D <i>Maximize Resources for Economic Outcomes</i>
1.	VEGETATION				
2.	<i>VEGETATION—GENERAL</i>				
3.	GOAL: No similar goal in current RMP.	GOAL: Manage vegetation communities to support and enhance a diverse and resilient ecosystem.	GOAL: Manage vegetation communities to enhance the unique landscapes, while sustaining and increasing native vegetation communities.	GOAL: Manage vegetation communities to facilitate traditional cultural and historical uses of the vegetation (including livestock grazing, medicinal plant and fuelwood gathering, and others).	GOAL: Manage vegetation communities to sustain healthy conditions and to promote responsible economic and commercial development (including fluid mineral development, livestock grazing, and big game wildlife production, i.e., hunting).
4.	Action: No similar action in current RMP.	Action: Control weeds and limit fragmentation.			
5.	Allowable Use: Continue to implement policies in the 2010 Farmington District Woodland Standard Operating Plan, or current version, regarding woodland product permits and the sale of woodland products for personal and small-scale commercial use.				
6.	Allowable Use: OG-MA-11. Pipelines will follow existing roads, where feasible, in order to minimize surface disturbance and consequent potential impacts on soils, vegetation, and habitats. This will also serve to reduce the potential for spread of noxious weeds (ROD, 4).	Allowable Use: Pipelines will follow existing disturbance, where feasible, which may include existing roads, utility ROWs and pipelines, and existing corridors, to reduce disturbance and minimize habitat fragmentation.			
7.	Action: No similar action in current RMP.	Action: Manage vegetation communities for FFO-Vegetation Condition Class (VCC) 2. FFO-VCCs are described in further detail in Appendix G.	Action: Manage vegetation communities for FFO-VCC 1. FFO-VCCs are described in further detail in Appendix G.	Action: Manage vegetation communities for FFO-VCC 3. FFO-VCCs are described in further detail in Appendix G.	

Combined cells indicate goals, objectives, or actions that apply to more than one alternative. Where an action in one or more alternatives does not apply to another, for example Alternative D, it states “No similar action.” Notably, lines 102, 110, 111, 112, 186, and 197, in gray, are summary rows that identify the general categories of lands allocated for each stipulation under each Alternative. The lines following these summary rows provide a more specific breakdown of the lands that carry certain stipulations under each alternative.

2.6.2 Quick Links to Resource and Resource Use Management Actions**BLM Resource and Resource Use Management Actions****VEGETATION** (p. 2-19)[General](#) (p. 2-19)[Ponderosa Pine-Mixed Conifer](#) (p. 2-20)[Treatments—General](#) (p. 2-20)[Treatments—Game Management Units](#) (p. 2-21)[Treatments—Firewood Management](#) (p. 2-22)[Treatments—SSS and Migratory Bird Treatment Stipulations](#) (p. 2-22)[Weeds](#) (p. 2-25)[Riparian](#) (p. 2-26)**LANDS WITH WILDERNESS CHARACTERISTICS** (p. 2-27)**FLUID MINERALS (Oil and Gas and Geothermal Resources)** (p. 2-29)[General](#) (p. 2-29)[Leasing](#) (p. 2-30)[Leasing Stipulations](#) (p. 2-33)[NSO for Specially Designated Areas](#) (p. 2-37)[NSO for Cultural Resources](#) (p. 2-37)[NSO for Geologic Resources](#) (p. 2-38)[NSO for Soil Resources](#) (p. 2-38)[NSO for Water Resources](#) (p. 2-38)**BIA Resource and Resource Use Management Actions**[Fluid Minerals—General Surface Disturbance](#) (p. 2-54)[Fluid Minerals—ROWs](#) (p. 2-56)[Fluid Minerals—Cultural Resources](#) (p. 2-56)[Fluid Minerals—Public Health and Safety](#) (p. 2-58)[Fluid Minerals—Water Resources](#) (p. 2-58)**FLUID MINERALS (Oil and Gas and Geothermal Resources) (cont'd)**[Leasing Stipulations \(cont'd\)](#)[NSO for Vegetation](#) (p. 2-38)[NSO for Special Status Species](#) (p. 2-38)[NSO for Communities](#) (p. 2-39)[NSO for State Parks and Wildlife Areas](#) (p. 2-39)[CSU for Specially Designated Areas](#) (p. 2-39)[CSU for Soil Resources](#) (p. 2-40)[CSU for Water Resources](#) (p. 2-40)[CSU for Vegetation](#) (p. 2-40)[CSU for Special Status Species](#) (p. 2-40)[TL for Cultural Resources](#) (p. 2-41)[TL for Wildlife](#) (p. 2-41)[TL for Special Status Species](#) (p. 2-42)**LANDS AND REALTY** (p. 2-44)[ROW Exclusion Areas](#) (p. 2-45)[ROW Avoidance Areas](#) (p. 2-46)[Utility Corridors \(Land Use Authorizations\)](#) (p. 2-52)[Land Tenure Adjustments \(Exchange\)](#) (p. 2-53)[Fluid Minerals—Livestock and Grazing](#) (p. 2-58)[Fluid Minerals—Socioeconomics](#) (p. 2-58)[Fluid Minerals—Yádiłhił and Light Pollution](#) (p. 2-59)[Fluid Minerals—Noise](#) (p. 2-59)

Table 2-2
Description of BLM No Action Alternative and Alternatives A, B, C, and D

Line #	No Action Alternative <i>Current Management</i>	Alternative A <i>Support Natural Ecosystems</i>	Alternative B <i>Preserve and Protect Chacoan and Cultural Landscapes</i>	Alternative C <i>Balance Community Needs and Development</i>	Alternative D <i>Maximize Resources for Economic Outcomes</i>
1.	VEGETATION				
2.	<i>VEGETATION—GENERAL</i>				
3.	GOAL: No similar goal in the 2003 RMP.	GOAL: Manage vegetation communities to support and enhance a diverse and resilient ecosystem.	GOAL: Manage vegetation communities to enhance the unique landscapes, while sustaining and increasing native vegetation communities.	GOAL: Manage vegetation communities to facilitate traditional cultural and historical uses of the vegetation (including livestock grazing, medicinal plant and fuelwood gathering, and others).	GOAL: Manage vegetation communities to sustain healthy conditions and to promote economic and commercial development (including fluid mineral development, livestock grazing, and big game wildlife production, i.e., hunting).
4.	Allowable Use: Continue to implement policies in the 2010 Farmington District Woodland Standard Operating Plan, or current version, regarding woodland product permits and the sale of woodland products for personal and small-scale commercial use.				
5.	Allowable Use: OG-MA-1 I. Pipelines will follow existing roads, where feasible, in order to minimize surface disturbance and consequent potential impacts on soils, vegetation, and habitats. This will also serve to reduce the potential for spread of noxious weeds (ROD, 4).	Allowable Use: Pipelines will follow existing disturbance, where feasible, which may include existing roads, utility ROWs and pipelines, and existing corridors, to reduce disturbance and minimize habitat fragmentation.			
6.	Action: No similar action in the 2003 RMP.	Action: Define FFO Vegetation Condition Classes (FFO-VCC) for vegetation management.			
7.	Action: No similar action in the 2003 RMP.	Action: Manage vegetation communities for FFO-VCC 2. FFO-VCCs are described in further detail in Appendix G.	Action: Manage vegetation communities for FFO-VCC 1. FFO-VCCs are described in further detail in Appendix G.	Action: Manage vegetation communities for FFO-VCC 3. FFO-VCCs are described in further detail in Appendix G.	
8.	Action: No similar action in the 2003 RMP; see SDA actions.	Action: Designate four plant conservation areas, totaling 6,800 acres, in habitat for listed plant species. In these areas, the conservation of native plant resources (currently listed under the Endangered Species Act [ESA]) is the management priority (see Figure 2-4; Appendix A). This acreage may change in the future based on future identified locations of listed plant species. The following management would apply to new leases and LUAs in these areas: • NSO stipulation • ROW exclusion	Action: No similar action.		
9.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Use all treatment tools available; choose the methods most appropriate for site-specific conditions to meet the objective selected. Vegetation community objectives should be based on best available data and management goals.			
10.	Action: No similar action in the 2003 RMP.	Action: Wildland fire would be used to protect, maintain, and enhance resources and, as nearly as possible, would be allowed to function in its natural ecological role. Use of fire would be based on the RMP and associated fire management plans and would follow specific prescriptions contained in operational plans.			
11.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Allow prescribed fuel wood gathering and cutting consistent with the public's fuel wood needs and the vegetation community objectives. Prohibit wood gathering and cutting in the badland areas to prevent soil destabilization.			

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
12.	Action: No similar action in the 2003 RMP.	Action: Require the use of native plant materials and seeds in all reclamation activities, unless the use of nonnative, noninvasive, introduced plant species would benefit the ecological integrity of the site. The introduction of such species includes opportunities for input from the public and land users during the on-site process. Site-specific analysis would provide justification, and documentation of the need is required for the BLM to consider its approved use. The BLM may consider exceptions to this policy, if research or well-founded empirical information indicates that benefits of nonnatives' competitive interactions on desired perennial vegetation outweigh the costs. Use of nonnative plants would be subject to a risk assessment through NEPA analysis.			
13.	Action: No similar action in the 2003 RMP.	Action: Control weeds and limit habitat fragmentation using best available tools and data. Tools to limit fragmentation include, but are not limited to, BMPs and COAs.			
14.	VEGETATION—PONDEROSA PINE-MIXED CONIFER				
15.	Allowable Use: WI-MA-6—Mitigation measures to protect or restore wildlife habitat include the following: • No hardwood tree with a diameter of 8 inches or more at the base or any ponderosa pine, Douglas-fir, or aspen tree is to be removed or damaged without approval from the BLM Authorized Officer (RMP, 2-26).				
16.	VEGETATION—TREATMENTS—GENERAL				
17.	Action: No similar action in the 2003 RMP.	Action: Vegetation treatments may include thinning, prescribed fire, selective herbicides appropriate to the community type, wood gathering and cutting, commercial cutting, seedings, shrub planting, and other treatments approved for BLM use. Treatments should be based on best available science and used only if appropriate with the community type according to monitoring. Encourage seed mixes that enhance native biodiversity.			
18.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Restrict vegetation treatments in areas of known identified sacred or medicinal plant gathering TCPs. Exceptions may be granted for traditional plant gathering areas that have invasive species.	Allowable Use: Plan vegetation treatments to enhance the cultural setting of historic properties eligible or potentially eligible under the 1966 NHPA, Criteria A, B, or C. Restrict vegetation treatments in areas of identified sacred or medicinal plant gathering TCPs. Exceptions may be granted for traditional plant gathering areas that have invasive species.	Allowable Use: Same as Alternative A.	
19.	Action: No similar action in the 2003 RMP.	Action: Vegetation treatments may use native species or desirable nonnative species, consistent with management actions, to achieve vegetation objectives. Site-specific analysis, using the best available, recent data and site-specific management goals, providing justification and documentation of the need for nonnatives, is required prior to use.			
20.	Action: No similar action in the 2003 RMP.	Action: Consultation under applicable regulations with Tribes and the public could be required before any vegetation would be treated on or near culturally important properties (CIMPPs).			
21.	Action: No similar action in the 2003 RMP.	Action: Use genetically appropriate native species in vegetation treatments, consistent with management actions to achieve vegetation objectives.	Action: Use only native species or cultivars of native species in vegetation treatments.	Action: Upland vegetation treatments may use native species, when available, or desirable nonnative species, consistent with management actions, to achieve vegetation objectives. Site-specific analysis, using the best available, recent science, providing justification and documentation of the need for nonnatives, is required prior to use.	Action: Upland vegetation treatments may use native species, when available, or desirable nonnative species, consistent with management actions to achieve vegetation objectives.
22.	Action: No similar action in the 2003 RMP.	Action: No mechanical or surface-disturbing vegetation treatments in lands managed to protect wilderness characteristics as a priority over other multiple uses.		Action: No similar action.	

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
23.	VEGETATION—TREATMENTS—GAME MANAGEMENT UNITS				
24.	Objective: No similar objective in the 2003 RMP.	Objective: Treatments in game management units (GMUs) would prioritize maintaining or improving the vegetation community's resiliency and improving land health. GMUs would be prioritized for treatments. Treatments would be designed according to the different vegetation communities in the GMU to accommodate their unique habitat management goals. If GMU boundaries change, the management objectives would change according to the revised GMU boundaries. See Figure 2-1, Appendix A.	Objective: Treatments in GMUs would prioritize improving or maintaining soil stability and the landscape's unique aesthetics. GMUs would be prioritized for treatments. Treatments would be designed according to the different vegetation communities in the GMU to accommodate their unique habitat management goals. If GMU boundaries change, the management objectives would change according to the revised GMU boundaries. See Figure 2-2, Appendix A.	Objective: Treatments in GMUs would prioritize enhancing traditional and historical use of vegetation. GMUs would be prioritized for treatments. Treatments would be designed according to the different vegetation communities in the GMU to accommodate their unique habitat management goals. If GMU boundaries change, the management objectives would change according to the revised GMU boundaries. See Figure 2-3, Appendix A.	Objective: Treatments in GMUs would prioritize promoting commercial development or economic use of the resources while mitigating this increased resource use. GMUs would be prioritized for treatments. Treatments would be designed according to the different vegetation communities in the GMU to accommodate their unique habitat management goals. If GMU boundaries change, the management objectives would change according to the revised GMU boundaries. See Figure 2-3, Appendix A.
25.	Action: No similar action in the 2003 RMP.	Action: GMU 2A would be priority level 1 for treatments. Treatment purposes would be system resiliency and land health improvement.	Action: GMU 2A would be priority level 1 for treatments. Treatment purpose would be soil stability.	Action: GMU 2A would be priority level 1 for treatments. Treatment purposes would be recreation, weed management, and soil stability.	Action: GMU 2A would be priority level 1 for treatments. Treatment purposes would be livestock grazing, big game habitat, weed management, and soil stability.
26.	Action: No similar action in the 2003 RMP.	Action: GMU 2B would be priority level 1 for treatments. Treatment purposes would be system resiliency and improving land health.	Action: GMU 2B would be priority level 2 for treatments. Treatment purposes would be soil stability and aesthetics.	Action: GMU 2B would be priority level 1 for treatments. Treatment purposes would be wildlife habitat, weed management, and soil stability.	Action: GMU 2B would be priority level 1 for treatments. Treatment purposes would be big game habitat, livestock grazing, weed management, and soil stability.
27.	Action: No similar action in the 2003 RMP.	Action: GMU 2C would be priority level 2 for treatments. Treatment purposes would be system resiliency and improving land health.	Action: GMU 2C would be priority level 2 for treatments. Treatment purposes would be soil stability, aesthetics, and TCPs.	Action: GMU 2C would be priority level 1 for treatments. Treatment purposes would be wildlife habitat and traditional plant uses.	Action: GMU 2C would be priority level 1 for treatments. Treatment purposes would be big game habitat, preventative weed management, soil stability, and livestock grazing.
28.	Action: No similar action in the 2003 RMP.	Action: GMU 5 (area includes the combination of the portions of GMUs 5A, 5B, and 6A inside the planning area) would be priority level 3 for treatments. Treatment purposes would be system resiliency and maintaining land health.	Action: GMU 5 would be priority level 3 for treatments. Treatment purposes would be soil stability and TCPs.	Action: GMU 5 would be priority level 2 for treatments. Treatment purpose would be wildlife habitat.	Action: GMU 5 would be priority level 2 for treatments. Treatment purposes would be big game habitat, preventative weed management, and soil stability.
29.	Action: No similar action in the 2003 RMP.	Action: GMU 7 would be priority level 3 for treatments. Treatment purposes would be system resiliency and maintaining land health.	Action: GMU 7 would be priority level 3 for treatments. Treatment purposes would be soil stability, aesthetics, and TCPs.	Action: GMU 7 would be priority level 1 for treatments. Treatment purposes would be livestock grazing, traditional plant uses, and woodcutting.	Action: GMU 7 would be priority level 1 for treatments. Treatment purposes would be livestock grazing, weed management, and soil stability.
30.	Action: No similar action in the 2003 RMP.	Action: Some treatments may occur in lower priority GMUs when funding is available through programs such as Natural Resources Conservation Service (NRCS) EQIP projects or 8100 funding.			

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
31.	VEGETATION—TREATMENTS—FIREWOOD MANAGEMENT				
32.	Action: Allow the cutting/collection of firewood, with a valid permit.				
33.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: • Close to firewood gathering native woody species in all riparian zones, including seeps and springs (nonnative woody species in these zones could be cut). Exceptions could be granted for permitted traditional uses, such as ceremonial uses of traditional plants. Limitations on removal of nonnative firewood may be implemented if stream bank stabilization could be compromised.	Allowable Use: Close the following areas to firewood gathering. Exceptions could be granted for permitted traditional uses, such as ceremonial uses of traditional plants. • Any site eligible under NHPA Criteria A, B, or C, for which the vegetation stand is a contributing element to NHPA eligibility • Any site eligible under NHPA Criterion D on which wood gathering and cutting could have an adverse effect • Native woody species in all riparian zones, including seeps and springs (nonnative woody species in these zones could be cut) • Limitations on removal of nonnative firewood may be implemented if stream bank stabilization could be compromised.	Allowable Use: Same as Alternative A.	
34.	Allowable Use: No similar action in the 2003 RMP.	Action: Based on current and best available data and management goals, greenwood firewood areas would be identified for selective thinning to reach resource goals. These areas would be monitored.			
35.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: The BLM Authorized Officer may approve or prohibit firewood gathering and cutting to prevent resource damage, due to sensitive wildlife seasons and extreme weather.	Allowable Use: No similar action.		
36.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Prohibit wood product sales and/or gathering and cutting on lands managed to protect wilderness characteristics as a priority over other multiple uses.	Allowable Use: No similar action. No lands would be managed to protect wilderness characteristics as a priority over other multiple uses under this alternative.		
37.	VEGETATION—TREATMENTS—SSS AND MIGRATORY BIRD TREATMENT STIPULATIONS				
38.	Allowable Use: No vegetation treatments from May 15 to August 1 without a migratory bird nest survey, if proposed disturbance would exceed 4.0 acres. If any active nests are located within the proposed project area, project activities would not be permitted until written approval by the BLM Authorized Officer. Exceptions may be granted by the BLM Authorized Officer if determined that the proposed actions would not significantly impact migratory birds and their habitat, or if the NEPA document adequately discloses impacts on nesting birds.	Allowable Use: For proposed projects with 4.0 acres or more of surface disturbance, no vegetation treatments from May 15 to July 31 will be conducted without a migratory bird nest survey. These surveys will be conducted by a BLM FFO-authorized biologist using provided survey protocol. If any active nests are in the proposed project area, project activities would not be allowed until written consent is received from the BLM Authorized Officer. If active nests are impacted during monitoring or project implementation, the monitoring and implementation may need to be adjusted, deferred or stopped if it determined the activities are disrupting the nest(s).			Allowable Use: No similar action. Compliance with the Migratory Bird Treaty Act would be required.
39.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: No vegetation treatment activities would be allowed within 3,168 feet (0.6 miles) of active pinyon jay colonial nest sites from April 1 to August 1. Noise levels should not exceed 48.6 dBA (A-weighted decibels) at the edge of the active nesting colony during this time period. Exceptions may be granted by the BLM Authorized Officer, if it is determined that proposed actions would not significantly affect migratory birds, special status species, and their habitat, or if the NEPA document adequately discloses impacts on nesting birds. Limitations for vegetation treatments involving the thinning of piñon-juniper woodland include:	Allowable Use: No vegetation treatment activities would be allowed within 1,640 feet (500 meters) of active pinyon jay colonial nest sites from April 1 to August 1. Noise levels should not exceed 48.6 dBA at the edge of the active nesting colony during this time period. Exceptions may be granted by the BLM Authorized Officer, if it is determined that	Allowable Use: No vegetation treatment activities would be allowed within active pinyon jay colonial nest sites from April 1 to August 1. Noise levels should not exceed 48.6 dBA at the edge of the active nesting colony during this time period. Exceptions may be granted by the BLM Authorized Officer, if it is determined that proposed actions would not	

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
		<ul style="list-style-type: none"> • Avoiding cutting or clearing of healthy, mature piñon woodland and piñon-juniper woodland. • Maintaining large landscapes of undisturbed piñon-juniper woodland habitat for foraging habitat and un-fragmented patches of at least 124 acres for nesting colony habitat. • Maintaining large, healthy piñon trees in areas of relatively high canopy cover for nesting and seed production. • Fire is not recommended as a management tool in piñon woodland or piñon-juniper woodland. 		<p>proposed actions would not significantly affect migratory birds, special status species, and their habitat, or if the NEPA document adequately discloses impacts on nesting birds.</p>	<p>significantly affect migratory birds, special status species, and their habitat, or if the NEPA document adequately discloses impacts on nesting birds.</p>
40.	<p>Allowable Use: For proposed vegetation projects within Clover's cactus (previously known as Brack's cactus) and Aztec gilia habitat, a biological survey would be required. When individual plants or suitable habitat for these plants are found within designated potential habitat during a biological survey for a proposed project, every effort to relocate the proposed project would be explored to minimize disturbance, following office policy and BLM Manual 6840.</p> <p>If proposed project activities are not initiated within 1 year of a biological survey, a new survey may be needed, depending on the location of the project area. A new biological survey would be determined by the BLM Authorized Officer on a case-by-case basis.</p>	<p>Allowable Use: Special status plant species biological evaluation will be required to be completed prior to any proposed vegetation projects in or next to special status plant species' potential, suitable, and/or occupied habitats. If proposed project activities do not begin within 1 year of a biological survey, a new survey may be needed, depending on the location of the project area. The need for a new biological survey would be determined by the BLM Authorized Officer on a case-by-case basis.</p> <p>Survey requirements are the following:</p> <ul style="list-style-type: none"> • Surveys must be conducted by a qualified biologist with appropriate botany experience for BLM/FFO sensitive plants/habitat within a proposed project area. • The area to be surveyed will include, at a minimum, the project area plus an additional 328 feet (100 meters) outside the project area. • Surveys will be conducted during the blooming season or the period in which the plant species is most easily detected, as determined by the BLM. <p>Based on the results of the survey, if special status plant species are identified within the project boundary and in the area of indirect/direct impacts or affected habitat, the following operational constraints would be required in occupied or suitable habitat:</p> <ul style="list-style-type: none"> • Avoidance/restriction of development, such as locating the surface disturbance area away from the edge of occupied or suitable habitat and ideally outside the area where indirect/direct impacts would occur (the area of avoidance could be a minimum of 164 feet (50 meters) but possibly greater than 656 feet (200 meters), as determined by the BLM). <p>Additional operational constraints may be required and could include any of the following:</p>	<p>Allowable Use: For proposed vegetation projects within or next to suitable habitat for BLM sensitive plants, a biological evaluation may be required, and the bio-evaluation will determine if subsequent special status plant surveys are required. If suitable habitat is documented within the proposed project area, avoidance, minimization, or relocation of the proposed project would be explored to minimize disturbance.</p> <p>If proposed ground disturbance has not commenced within one year of a biological survey, a new biological evaluation will be conducted to determine if another survey will be required.</p> <p>Survey requirements are the following:</p> <ul style="list-style-type: none"> • Special status plant surveys must be conducted by a qualified botanist. • The area to be surveyed will include suitable habitat and appropriate buffer, as determined by the biological evaluation. • Special status plant surveys will be conducted during the blooming season or the period in which the plant species is most easily detected, as determined by the BLM. <p>If suitable habitat for special status plants are identified within the proposed project area, project boundaries and/or activities will be shifted to avoid suitable habitat. Appropriate disturbance buffers will be applied to minimize impacts to the habitat. Additional constraints may be required and could include any of the following:</p> <ul style="list-style-type: none"> • Dust abatement measures • Signs, fencing, and other deterrents to reduce possible human disturbance • Disturbance (including projects within 328 feet [100 meters] of occupied habitat) outside the blooming season 	<p>Allowable Use: For proposed vegetation projects in or next to potential, suitable, and/or occupied special status plant species habitat, a biological survey may be required. When individual plants or suitable habitat for them are found in designated potential habitat during a biological survey for a proposed project, every effort to relocate the proposed project would be explored to minimize disturbance.</p> <p>If proposed project activities do not begin within 1 year of a biological survey, a new survey may be needed, depending on the location of the project area. A new biological survey would be determined by the BLM Authorized Officer on a case-by-case basis.</p>	

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		<ul style="list-style-type: none"> • Dust abatement measures • Signs, fencing, and other deterrents to reduce possible human disturbance • Surface disturbance (including projects within 328 feet [100 meters] of occupied habitat) outside the blooming season • Specialized reclamation procedures such as <ul style="list-style-type: none"> ○ Separating topsoil and subsoil layers with barriers to be reclaimed in the correct order ○ Using a higher percentage of forbs in the reclamation seed mix to promote pollinator habitat ○ Collecting seeds for sensitive plant species' genetic preservation, grow-out, and reclamation • Long-term monitoring of indirect/direct impacts on the species and/or habitat • Nonnative or invasive species monitoring and control in occupied and suitable habitat • Off-site mitigation, such as conservation easements, funding for research, mitigation, or habitat protection/improvement projects, to offset impacts on occupied plant populations (40 CFR 1508.20). 	<ul style="list-style-type: none"> • Long-term monitoring of indirect/direct impacts on the species and/or habitat • Nonnative or invasive species monitoring and control in occupied and suitable habitat 		
41.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: No surface construction or ground disturbance would be allowed within up to 330 feet (100 meters) of occupied special status plant species habitat during periods when the species is most sensitive, such as during blooming and fruiting/seeding periods.</p>	<p>Allowable Use: No similar action.</p>		
42.	<p>Allowable Use: Vegetation treatment avoidance within Gunnison's prairie dog towns. If avoidance is not possible, incorporate BMPs.</p>	<p>Allowable Use: No ground-disturbing activities within 165 feet (50 meters) of active Gunnison's prairie dog colony boundary. Ground-disturbing activity may be permitted using BMPs, if Gunnison's prairie dog colony overlaps existing disturbance or if other alternatives, through the NEPA process, have been determined not to be reasonable.</p>		<p>Allowable Use: No ground-disturbing activities within the boundary of active Gunnison's prairie dog colony boundary. Ground-disturbing activity is permitted using BMPs, if the Gunnison's prairie dog colony overlaps existing disturbance or if other alternatives have been determined, through the NEPA process, not to be reasonable.</p>	
43.	<p>Allowable Use: A pre-treatment survey for mountain plover is required for proposed projects scheduled to be carried out within designated potential habitat during the nesting season of April 1 to August 1. Occupied mountain plover habitat would not be disturbed from April 1 to August 1.</p>	<p>Allowable Use: No similar action.</p>			
44.	<p>Allowable Use: No vegetation treatments would be conducted between February 1 and June 30 within 0.5 miles of an active or historical bald or golden eagle nest.</p>				

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45.	Allowable Use: No vegetation treatments would be conducted between March 1 and June 30 within 0.33 miles of an active or historical nest.	Allowable Use: Vegetation treatments are not allowed during seasonal raptor nesting periods. Raptor nesting sites, both active and historical, would be avoided by the distances and seasonal periods listed below. <ul style="list-style-type: none"> • Ferruginous hawk—0.33 miles (March 1 to June 30) • Prairie falcon—0.33 miles (March 1 to June 30) • Peregrine falcon—0.33 miles (March 1 to June 30) • Osprey—0.25 miles during the nesting/rearing stage (April 1 to August 31) • Noise from equipment that operates on a continuous (more than 8 hours/day on a long-term basis for more than 1 week) would be kept at or below 48.6 dBA at specified locations to minimize disturbances to raptor nest sites for ferruginous hawks and prairie falcons. 			Allowable Use: No similar action. Compliance with the Migratory Bird Treaty Act would be required.
46.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: A survey for burrowing owls is required for a treatment in designated potential nesting habitat from April 1 to August 15. Occupied burrowing owl nests should not be disturbed within a 165-foot radius from April 1 to August 15.			Allowable use: No similar action.
47.	VEGETATION—WEEDS				
48.	Objective: NW-O-1: Detect invasive plant species populations, prevent the spread of new invasive populations, manage existing populations using the tools of integrated weed management, and eradicate invasive populations using the safest environmental methods available (RMP, 2-24).				
49.	Action: Manage invasive species as directed in the 2003 RMP and the 2007 and 2016 Vegetation Treatments programmatic EISs (PEISs) or as directed in the most current BLM guidance (BLM 2007; BLM 2016a).				
50.	Action: NW-MA-A-4—The BLM would comply with changes in label directions and with all state registration requirements (BLM 2007, 2-1).	Action: NW-MA-A-4—The BLM would comply with changes in label directions and with all state registration requirements or Tribal and local registration requirements.			
51.	Action: NW-MA-A-5—If state registration requirements do not allow the application of a particular herbicide’s active ingredient approved for use in the PEIS, the BLM would not authorize use of the herbicide active ingredient within the state where its use is prohibited (BLM 2007, 2-1).	Action: NW-MA-A-5—If Tribal, state, or local registration requirements do not allow the application of a particular herbicide’s active ingredient approved for use in the PEIS, the BLM would not authorize its use in the area where it is prohibited.			
52.	Action: NW-MA-A-7—The BLM may consider the use of new herbicide active ingredients, products, and technologies in vegetation treatment projects. The BLM may also reconsider the use of herbicide active ingredients approved in previous EIS RODS but not approved for use under this PEIS ROD. The process for identifying, evaluating, and approving herbicide active ingredients is outlined in the scientific methodology protocol attached to the 2007 Vegetation Treatment PEIS ROD as Appendix A (BLM 2007, 2-1).	Action: The BLM may consider the use of new herbicide active ingredients, products, and technologies in vegetation treatment projects, including those approved in future EIS RODs. The BLM may also reconsider the use of herbicide active ingredients approved in previous EIS and PEIS RODs, including the 2007 and 2016 Vegetation Treatment PEIS RODs (BLM 2007, 2016a). The process for identifying, evaluating, and approving herbicide active ingredients is outlined in the scientific methodology protocol attached to the 2007 Vegetation Treatment PEIS ROD as Appendix A (BLM 2007, 2-1).			
53.	Action: No similar action in the 2003 RMP.	Action: Consultation per applicable regulations with Tribes and the public, as appropriate, would be required before any weed treatments would occur on or near CIMPPs.			

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54.	VEGETATION—RIPARIAN				
55.	GOAL: No similar goal in the 2003 RMP.	GOAL: Provide for healthy, functioning, and resilient riparian areas.	GOAL: Manage riparian areas to enhance their unique contributions in the arid environment.	GOAL: Manage functioning riparian areas to support traditional and historical uses.	GOAL: Sustain functioning riparian conditions and minimize effects of enhanced resource development.
56.	Objective: No similar objective in the 2003 RMP.	Objective: Improve all designated riparian and wetland area ratings by maintaining all current proper functioning condition (PFC) ratings and facilitating upward trends in all other areas to achieve PFC ratings at a minimum, with the ultimate objective to reach PFC in all.		Objective: Improve all designated riparian and wetland areas in nonfunctional and functional at-risk (FAR) downward trend to reach FAR upward trend, at a minimum, with the ultimate objective to reach PFC in all.	
57.	Objective: No similar objective in the 2003 RMP.	Objective: Priorities: 1. Maintain current PFC ratings 2. Improve nonfunctional ratings and all FAR ratings with downward and not apparent trend to upward trend 3. Improve all FAR ratings to PFC		Objective: Priorities: 1. Improve nonfunctional ratings and all FAR ratings with downward and not apparent trend to upward trend 2. Maintain current PFC ratings 3. Improve FAR ratings to PFC	
58.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Prohibit gathering and cutting of woody species in all riparian zones, including seeps and springs. Exceptions could be granted for permitted traditional uses, such as ceremonial uses of traditional plants. Nonnative woody species in these zones could also be cut or gathered.			
59.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Nonnative vegetation treatments within designated critical habitat of the yellow-billed cuckoo and potential nesting habitat of the southwestern willow flycatcher would have seasonal and treatment size restrictions developed, in consultation with the BLM Authorized Officer and in conjunction with special management considerations outlined in the <i>Federal Register</i> . Any proposed projects in riparian habitat may be subject to Section 7 consultation under the ESA.			
60.	Action: Continue to apply the following measures from Table 3.1 in the 2000 Aquatic and Riparian Habitat Management Plan (BLM 2000), updating measures as needed based on best available data:				
	Practice	Objective	Comment		
	Fencing	Isolate degraded habitats	Consider big game migration, public access, beaver activity, falling trees, and vehicles.		
	Prescribed burns	Modify vegetation communities	Primarily for upland areas; prudent use in areas of special concerns (e.g., endangered species).		
	Forestry practices	Improve woody vegetation communities	Cover or canopy manipulation of coniferous and deciduous stands, woody debris, and slash management.		
	Vegetation plantings	Reestablish native communities	Cuttings work well for woody vegetation; insert below water table; seeding generally takes place in the fall or spring; rake after application.		
	Opportunities from mineral activities	Mitigate mineral exploitation effects	Reclaim to utilize beneficial runoff or drainage; riparian habitat development in association with evaporation ponds; water spreaders to direct runoff from road construction.		
	Structures	Control erosion	Bank protection, gradient restoration, water energy-transfer structures, sediment traps, spring developments, removal or modification of channelization structures, site drainage designs, and final rehabilitation contours describing how slope failure/erosion would be avoided		
	Beaver complex cycling	Transform pioneer woody vegetation into riparian community	Cycling of beaver complexes; special management to maximize vegetation regrowth rates; maximize initial construction population followed by reductions for maintenance levels		
	Bank stabilization	Accelerate soil and water conservation efforts	Anchoring green trees (or discarded Christmas trees) into banks; log structures (10- to 12-inch diameter) at base of bank; rock in wire baskets (gabions)		
	Recreation planning	Protect, manage, and improve habitats	Maintain visitor compliance; retain vegetation; locate sites outside of riparian areas; prohibit vehicles from uncontrolled stream access; plant dense vegetation to screen and reduce use of sensitive areas; install signs; designate sites within riparian areas		
	Road relocation, construction, and maintenance	Protect, manage, and improve habitats	Locate outside of riparian area; prohibit vehicles from leaving roads; install signs; minimize impacts on stream bank and vegetation; revegetate disturbed areas; design and maintain culverts to allow fish passage and free debris flow; haul waste material away		
	Public education	Provide information to public land users on protection methods	Develop environmental education and interpretative displays designed to direct visitor or user behavior in or adjacent to riparian areas.		
	Road surfacing	Protect riparian habitats from siltation	Apply crushed rock surfacing material in accordance with BLM standards to roads from which runoff could result in siltation of riparian areas		
	Drainage facilities	Protect riparian habitats from siltation	Install culverts in accordance with BLM standards on roads from which runoff could result in siltation of riparian areas		
	Well pad rehabilitation	Protect riparian habitats from siltation	Revegetate areas disturbed for well pad construction that are not protected by surfacing and areas that are disturbed by well pad restoration		
	ROWs	Protect riparian habitats from siltation	Revegetate areas disturbed by construction in the well field and support facility ROWs to prevent erosion and subsequent deposition in riparian areas		
61.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Site-specific mitigation measures would be developed to mitigate the removal or disturbance of riparian/wetland vegetation.			

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62.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Site integrity must be maintained to avoid adverse impacts on riparian/wetland areas that may be associated with the natural lateral movement of the active channel.			
63.	Allowable Use: Projects must conform with interim and final reclamation procedures.				
64.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Engineered low water crossings would be constructed, maintained, and monitored according to standards in the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (commonly referred to as The Gold Book).			
65. LANDS WITH WILDERNESS CHARACTERISTICS					
66.	GOAL: No similar goal in the 2003 RMP.	GOAL: Manage lands to protect wilderness characteristics (e.g., appearance of naturalness and outstanding opportunities for primitive and unconfined recreation or solitude), while considering competing resource demands and manageability, such as valid and existing rights, mineral potential, and other uses.	GOAL: No similar goal.		
67.	Objective: No similar objective in the 2003 RMP.	Objective: Where wilderness characteristics are managed for protection, minimize surface-disturbing activities, such that the natural quality of the area is maintained, and maintain opportunities for solitude and primitive recreation where they occur in the areas.		Objective: No similar objective.	
68.	Action: No similar action in the 2003 RMP (Figure 2-5; Appendix A).	Action: 24,300 acres would be managed to protect wilderness characteristics as a priority over other multiple uses in the following areas (Figure 2-6; Appendix A): <ul style="list-style-type: none"> • Unit 069 (5,900 acres) • Unit 075 (8,300 acres) • Unit 082 (10,100 acres) 		Action: No similar action. Other multiple uses would be emphasized as a priority over protecting wilderness characteristics (Figure 2-5; Appendix A).	
69.	<i>Unit 069</i>				
70.	Objective: No similar objective in the 2003 RMP.	Objective: Manage Unit 069 to protect outstanding opportunities for solitude, primitive and unconfined recreation, and undisturbed landscapes compatible with zone objectives in the Farmington RMP (BLM 2003) and with special attention to protecting wildlife habitat and cultural resources.		Objective: No similar objective.	
71.	Action: No similar action in the 2003 RMP.	Action: Protect wilderness characteristics by applying the following management: <ul style="list-style-type: none"> • Recommend withdrawal from locatable mineral entry • Eliminate from future consideration for coal leasing, subject to valid existing rights • Close to new fluid mineral leasing; do not reissue existing leases that expire • Manage as a ROW exclusion area • Close to surface-disturbing activities associated with new construction that could impair wilderness characteristics, with the exception of development for valid and existing rights • Close to wood product sales and harvest, including Christmas tree cutting • Do not allow mechanical or surface-disturbing vegetation treatments 	Action: Protect wilderness characteristics by applying the following management: <ul style="list-style-type: none"> • Eliminate from future consideration for coal leasing, subject to valid existing rights • Close to new fluid mineral leasing; do not reissue existing leases that expire • Manage as a ROW exclusion area • Close to surface-disturbing activities associated with new construction that could impair wilderness characteristics, with the exception of development for valid and existing rights • Close to wood product sales and harvest, including Christmas tree cutting • Do not allow mechanical or surface-disturbing vegetation treatments 	Action: No similar action.	

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72.	<i>Unit 075</i>				
73.	Objective: No similar objective in the 2003 RMP.	Objective: Manage Unit 075 for the protection of outstanding opportunities for solitude and undisturbed landscapes. This unique roadless area has outstanding opportunities for solitude, given the unique topography and vegetation, which call for special attention to protect wildlife habitat and cultural resources.		Objective: No similar objective.	
74.	Action: No similar action in the 2003 RMP.	Action: Protect wilderness characteristics by applying the following management: <ul style="list-style-type: none"> • Recommend withdrawal from locatable mineral entry • Eliminate from future consideration for coal leasing, subject to valid existing rights • Close to new fluid mineral leasing; do not reissue leases that expire • Close to nonenergy solid mineral leasing • Manage as a ROW exclusion area • Close to wood product sales and/or gathering and cutting, including Christmas tree cutting • Do not allow mechanical or surface-disturbing vegetation treatments 	Action: Protect wilderness characteristics by applying the following management: <ul style="list-style-type: none"> • Recommend withdrawal from locatable mineral entry • Eliminate from future consideration for coal leasing, subject to valid existing rights • Close to new fluid mineral leasing; do not reissue leases that expire • Close to nonenergy solid mineral leasing • Manage as a ROW exclusion area • Close to wood product sales and/or gathering and cutting, including Christmas tree cutting • Do not allow mechanical or surface-disturbing vegetation treatments 	Action: No similar action.	
75.	<i>Unit 082</i>				
76.	Objective: No similar objective in the 2003 RMP.	Objective: Manage Unit 082 to protect outstanding opportunities for solitude and undisturbed landscapes, compatible with objectives in the 2003 RMP (BLM 2003) and this amendment and with special attention to protecting viewsheds, wildlife habitat, and cultural resources.		Objective: No similar objective.	
77.	Action: No similar action in the 2003 RMP.	Action: Protect wilderness characteristics by applying the following management: <ul style="list-style-type: none"> • Recommend withdrawal from locatable mineral entry • Eliminate from future consideration for coal leasing, subject to valid existing rights • Close to fluid mineral leasing • Close to nonenergy solid mineral leasing • Manage as a ROW exclusion area • Close to wood product sales and harvest, including Christmas tree cutting • Do not allow mechanical or surface-disturbing vegetation treatments 	Action: Protect wilderness characteristics in identified areas by applying the following management: <ul style="list-style-type: none"> • Recommend withdrawal from locatable mineral entry • Eliminate from future consideration for coal leasing, subject to valid existing rights • Close to fluid mineral leasing • Close to nonenergy solid mineral leasing • Manage as a ROW exclusion area • Close to wood product sales and harvest, including Christmas tree cutting • Do not allow mechanical or surface-disturbing vegetation treatments 	Action: No similar action.	

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78.	Resource Uses				
79.	FLUID MINERALS (Oil and Gas and Geothermal Resources)				
80.	FLUID MINERALS—GENERAL				
81.	GOAL: Provide opportunities for exploration, leasing, and development of fluid minerals, while providing resource protection and multiple use on public lands. Minimize impacts on the natural and human environment to ensure the resiliency of renewable and nonrenewable resources through the use of BMPs, design features, and mitigation measures.				
82.	Objective: Consider and respond to nominated lease parcels for leasing and mineral development. Apply appropriate lease stipulations in order to protect sensitive resources. Allow mineral development on new and existing leases by considering and responding to APDs. Minimize impacts on the natural and human environment to ensure the resiliency of renewable and nonrenewable resources, through BMPs, design features, mitigation measures, and COAs.				
83.	Allowable Use: OG-MA-7. Companies applying for permits to drill may be required to evaluate the use of new technology, such as directional drilling from existing pads and other techniques, in order to reduce surface disturbance, with its consequent impacts on soil, water, vegetation, and air resources (ROD, 4).	Allowable Use: Same as the No Action Alternative, plus: Companies applying for permits to drill may be required to evaluate a phased development plan, liquid gathering systems, off-site facilities, the use of new technology, such as directional and horizontal drilling from existing pads and other techniques to reduce surface disturbance with its consequent impacts on cultural, recreation, lands managed to protect wilderness characteristics, soil, water, vegetation, wildlife, special status species, and air resources.			
84.	Allowable Use: OG-MA-9. Dual completion, recompletion, and commingling (both downhole and at the surface) would be encouraged and permitted in order to reduce the number of new well pads and consequent surface disturbance (ROD, 4).	Allowable Use: Dual completion, recompletion, and commingling (both downhole and at the surface on the lease) would be encouraged and permitted in order to reduce the number of new well pads and consequent surface disturbance.			
85.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Require collocation of wells on existing well pads in sensitive wildlife areas.	Allowable Use: Require collocation of wells on existing well pads in wildlife area SDAs.	Allowable Use: No similar action.	
86.	Allowable Use: OG-MA-11. Pipelines would follow existing roads where feasible in order to minimize surface disturbance and consequent potential impacts on soils, vegetation, and habitats. This would also serve to reduce the potential for spread of noxious weeds (ROD, 4).	Allowable Use: Pipelines are required to follow existing disturbance, which may include roads, utility ROWs and pipelines, and corridors, to reduce disturbance and minimize habitat fragmentation. Exceptions would be applied in areas where following existing disturbance is determined infeasible by the BLM Authorized Officer.		Allowable Use: New pipelines, roads, power lines, and any other ancillary development authorizations are required to follow existing ROWs or disturbance areas, unless following existing disturbance would cause greater impacts on resources than an alternate route. Examples of existing disturbance areas include, but are not limited to, access roads, pipelines, utility lines, and ROW corridors.	
87.	Action: No similar action in the 2003 RMP.	Action: New oil and gas wells would be sited outside designated ROW corridors.			
88.	Allowable Use: OG-MA-14. Remote telemetry of well data and piping of produced water would be required, where feasible, to reduce the number of vehicle visits to wells, in order to reduce disturbance to wildlife and direct mortality as a result of road kills. It would also reduce the amount of dust, potential increased sedimentation, and disruption of livestock operations and recreational uses (ROD, 5).	Allowable Use: Same as the No Action Alternative, plus require remote telemetry of wells. Operators developing wells within 10 miles of CCNHP are required to use liquids gathering systems and off-site facilities.		Allowable Use: Same as the No Action Alternative, plus require remote telemetry of wells.	Allowable Use: Same as the No Action Alternative, plus promote remote telemetry of wells.
89.	Allowable Use: OG-MA-15. The FFO would assist operators in designing plans of development to minimize impacts on oil and gas operations, while meeting wildlife and special status species goals (ROD, 5).	Allowable Use: Operators may be required to develop a master development plan (MDP) or multiple MDPs or to include additional surface information in plans of development submitted under a lease agreement.			
90.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Require lease operators to consult with applicable transportation and roads departments of Tribal, state, and local agencies regarding permits and to limit impacts on road networks.			

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91.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Require roads to conform to the BLM Road Design Handbooks: H-9113-1 and H-9115-1.			
92.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Require physical barriers or other methods to keep unauthorized roads from being developed, intentionally or inadvertently.			
93.	Action: No similar action in the 2003 RMP.	Action: Require companies to reuse produced water and flow back water in oil and gas development, when feasible, as determined by the BLM Authorized Officer.	Action: Encourage companies to reuse produced water and flow back water in oil and gas development.		
94.	Action: No hardwood tree with a diameter of 8 inches or more at the base or any ponderosa pine, Douglas-fir, or aspen tree is to be removed or damaged without approval from the BLM Authorized Officer.				
95.	Action: No similar action in the 2003 RMP.	Action: Operators must avoid harassing all wildlife at well pads, facilities, and associated infrastructure.			
96.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: No similar action.			
97.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: No similar action.			
98.	FLUID MINERALS—LEASING				
99.	Summary: OPEN TO LEASING with STANDARD TERMS and CONDITIONS OG-A-1. A total of 737,700 acres of BLM-managed land would be open for oil and gas leasing and development under Standard Terms and Conditions (ROD, 3): <ul style="list-style-type: none"> • BLM surface/federal mineral estate—331,000 acres • Non-BLM surface/federal mineral estate—406,700 acres 	Summary: OPEN TO LEASING with STANDARD TERMS and CONDITIONS Manage 241,000 acres of the federal mineral estate as open to fluid mineral leasing, subject to standard lease terms and conditions: <ul style="list-style-type: none"> • BLM surface/federal mineral estate—87,500 acres • Non-BLM surface/federal mineral estate—153,500 acres 	Summary: OPEN TO LEASING with STANDARD TERMS and CONDITIONS Sub-Alternative B1 Manage 188,500 acres of the federal mineral estate as open to fluid mineral leasing, subject to standard lease terms and conditions: <ul style="list-style-type: none"> • BLM surface/federal mineral estate—64,300 acres • Non-BLM surface/federal mineral estate—124,200 acres Sub-Alternative B2 Manage 185,600 acres of the federal mineral estate as open to fluid mineral leasing, subject to standard lease terms and	Summary: OPEN TO LEASING with STANDARD TERMS and CONDITIONS Sub-Alternative C1 Manage 685,000 acres of the federal mineral estate as open to fluid mineral leasing, subject to standard lease terms and conditions: <ul style="list-style-type: none"> • BLM surface/federal mineral estate—280,400 acres • Non-BLM surface/federal mineral estate—404,600 acres Sub-Alternative C2 Manage 661,100 acres of the federal mineral estate as open to fluid mineral leasing, subject to standard lease terms and conditions: <ul style="list-style-type: none"> • BLM surface/federal mineral estate—271,700 acres • Non-BLM surface/federal mineral estate—389,400 acres Sub-Alternative C3 Manage 633,900 acres of the federal mineral estate as open to fluid mineral leasing, subject to standard lease terms and conditions: <ul style="list-style-type: none"> • BLM surface/federal mineral estate—260,900 acres • Non-BLM surface/federal mineral estate—373,000 acres Sub-Alternative C4 Manage 597,500 acres of the federal mineral estate as open to fluid mineral leasing, subject to standard lease terms and conditions:	Summary: OPEN TO LEASING with STANDARD TERMS and CONDITIONS Manage 769,200 acres of the federal mineral estate as open to fluid mineral leasing, subject to standard lease terms and conditions: <ul style="list-style-type: none"> • BLM surface/federal mineral estate—343,400 acres • Non-BLM surface/federal mineral estate—425,800 acres

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
			conditions: <ul style="list-style-type: none"> • BLM surface/federal mineral estate—63,200 acres • Non-BLM surface/federal mineral estate—122,400 acres 	<ul style="list-style-type: none"> • BLM surface/federal mineral estate—240,800 acres • Non-BLM surface/federal mineral estate—356,700 acres <p>Sub-Alternative C5 Manage 558,100 acres of the federal mineral estate as open to fluid mineral leasing, subject to standard lease terms and conditions:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—217,400 acres • Non-BLM surface/federal mineral estate—340,700 acres <p>Sub-Alternative C6 Manage 633,900 acres of the federal mineral estate as open to fluid mineral leasing, subject to standard lease terms and conditions:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—260,900 acres • Non-BLM surface/federal mineral estate—373,000 acres 	
100.	<p>Summary: CLOSED TO LEASING Manage 109,100 acres of the federal mineral estate underlying BLM-managed surface as closed to fluid mineral leasing (Figure 2-7, Appendix A).</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—96,300 acres • Non-BLM surface/federal mineral estate—12,800 acres <p>The following areas would be closed to fluid mineral leasing (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Nondiscretionary closures • Listed SDAs (as listed/detailed in the 2003 RMP) 	<p>Summary: CLOSED TO LEASING Manage 543,500 acres of the federal mineral estate underlying BLM-managed surface as closed to fluid mineral leasing (Figure 2-8, Appendix A).</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—397,900 acres • Non-BLM surface/federal mineral estate—145,600 acres <p>The following areas would be closed to fluid mineral leasing (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Chacoan roads and outliers 2-mile zone • CCNHP 2-mile zone • Nondiscretionary closures • Listed SDAs • Lands managed to protect wilderness characteristics • Jackson Lake Wildlife Area • Cutter and Navajo reservoirs 2-mile zone 	<p>Summary: CLOSED TO LEASING Sub-Alternative B1 Manage 726,500 acres of the federal mineral estate underlying BLM-managed surface as closed to fluid mineral leasing (Figure 2-9, Appendix A).</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—494,700 acres • Non-BLM surface/federal mineral estate—231,800 acres <p>The following areas would be closed to fluid mineral leasing (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Chacoan roads and outliers 3-mile zone • CCNHP 10-mile zone • Nondiscretionary closures • Listed SDAs • Lands managed to protect wilderness characteristics • Jackson Lake Wildlife Area • Cutter and Navajo reservoirs 2-mile zone <p>Sub-Alternative B2 Manage 825,700 acres of the federal mineral estate underlying BLM-managed surface as closed to fluid mineral leasing (Figure 2-10, Appendix A).</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—571,300 acres • Non-BLM surface/federal mineral estate— 	<p>Summary: CLOSED TO LEASING Sub-Alternatives C1–C5 Manage 109,100 acres of the federal mineral estate underlying BLM-managed surface as closed to fluid mineral leasing (Figure 2-11, Appendix A).</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—96,300 acres • Non-BLM surface/federal mineral estate—12,800 acres <p>The following areas would be closed to fluid mineral leasing (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Nondiscretionary closures • Listed SDAs <p>Sub-Alternative C6 Manage 153,800 acres of the federal mineral estate underlying BLM-managed surface as closed to fluid mineral leasing (Figure 2-12, Appendix A).</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—110,300 acres • Non-BLM surface/federal mineral estate—43,500 acres 	<p>Summary: CLOSED TO LEASING Manage 109,100 acres of the federal mineral estate underlying BLM-managed surface as closed to fluid mineral leasing (Figure 2-13, Appendix A).</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—96,300 acres • Non-BLM surface/federal mineral estate—12,800 acres <p>The following areas would be closed to fluid mineral leasing (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Nondiscretionary closures • Listed SDAs

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
			254,400 acres The following areas would be closed to fluid mineral leasing (see rows below for details on each area): Same as Sub-Alternative B1 except: • CCNHP 15-mile zone, including around Pueblo Pintado and Kin Bineola	The following areas would be closed to fluid mineral leasing (see rows below for details on each area): Same as Sub-Alternatives C1–C5 plus: • CCNHP 4-mile zone	
101.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Close the following areas to fluid mineral leasing, to minimize noise and visual impacts (see Appendix H): • A 2-mile zone around designated Chacoan roads (including those in and outside of ACECs) and outliers • A 2-mile zone around the CCNHP	Allowable Use: Sub-Alternative B1: Close the following areas to fluid mineral leasing, to minimize noise and visual impacts (see Appendix H): • A 3-mile zone around designated Chacoan roads, including those in and outside of ACECs, and outliers • A 10-mile zone around CCNHP Sub-Alternative B2: Same as Sub-Alternative B1 except: • A 3-mile zone around designated Chacoan roads, including those in and outside of ACECs, and outliers • A 15-mile zone around CCNHP, including around Pueblo Pintado and Kin Bineola	Allowable Use: Sub-Alternatives C1–C5: No similar action. Sub-Alternative C6: Close the following areas to fluid mineral leasing, to minimize noise and visual impacts (see Appendix H): • A 4-mile zone around the CCNHP	Allowable Use: No similar action.
102.	Action: OG-A-5. There would be nondiscretionary closures on 54,100 acres. These areas are contained in designated Wilderness and other legislatively protected areas (ROD, 3) listed below: • Ah-shi-sle-pah Wilderness • Bisti/De-Na-Zin Wilderness Area • Fossil Forest Research Natural Area • Lake Valley Chaco Cultural Archaeological Protection Site				
103.	Action: OG-A-6. Approximately 88,300 acres in SDAs would be closed to new leasing (ROD, 3), as follows: Listed ACECs from 2003 RMP Chaco Culture Archaeological Protection Sites from 2003 RMP RNA: Reese Canyon Research Natural Area Recreation/Natural/Wildlife Areas • Carracas Mesa ERMA/Wildlife Area • East La Plata Wildlife Area • Thomas Canyon ERMA/Wildlife Area	Action: Approximately 304,000 acres in SDAs would be closed to new leasing, as follows: Listed ACECs from 2003 RMP Chaco Culture Archaeological Protection Sites from 2003 RMP RNAs: Same as the No Action Alternative Recreation/Natural/Wildlife Areas • Carracas Mesa ERMA/Wildlife Area • Cereza Canyon Wildlife Area • Crow Mesa Wildlife Area • East La Plata Wildlife Area • Ensenada Mesa Wildlife Area • Gonzales Mesa Wildlife Area • Middle Mesa Wildlife Area • Rosa Mesa Wildlife Area • Thomas Canyon ERMA/Wildlife Area	Action: Sub-Alternatives B1 and B2: Approximately 269,000 acres in SDAs would be closed to new leasing, as follows: Listed ACECs from 2003 RMP Chaco Culture Archaeological Protection Sites from 2003 RMP RNAs: Same as the No Action Alternative Recreation/Natural/Wildlife Areas • Carracas Mesa ERMA/Wildlife Area • Cereza Canyon Wildlife Area • East La Plata Wildlife Area • Ensenada Mesa Wildlife Area • Gonzales Mesa Wildlife Area • Middle Mesa Wildlife Area • Rosa Mesa Wildlife Area • Thomas Canyon ERMA/Wildlife Area	Action: Sub-Alternatives C1–C6: Approximately 227,300 acres in SDAs would be closed to new leasing, as follows: Listed ACECs from 2003 RMP Chaco Culture Archaeological Protection Sites from 2003 RMP RNA: Reese Canyon Research Natural Area Recreation/Natural/Wildlife Areas: • Carracas Mesa ERMA/Wildlife Area • East La Plata Wildlife Area • Middle Mesa Wildlife Area • Rattlesnake Canyon Wildlife Area • Thomas Canyon ERMA/Wildlife Area	Action: Same as the No Action Alternative.

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
104.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Lands managed to protect wilderness characteristics as a priority over other multiple uses would be closed to leasing. As leases expire, they would not be reissued.		Allowable Use: No similar action.	
105.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Federal mineral estate beneath Jackson Lake Wildlife Area is closed to leasing. As leases expire, they would not be reissued.		Allowable Use: No similar action. See NSO section.	Allowable Use: No similar action.
106.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Close areas within 2 miles of Cutter and Navajo Reservoirs to leasing. As existing leases within 2 miles of Cutter and Navajo reservoirs expire, they would not be reissued.		Allowable Use: No similar action.	
107.	FLUID MINERALS—LEASING STIPULATIONS				
108.	<p>Summary: OPEN TO LEASING WITH A NO SURFACE OCCUPANCY STIPULATION (all NSOs): Prohibit surface occupancy on 83,800 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—62,200 acres • Non-BLM surface/federal mineral estate—21,600 acres (refer to Appendix D and Figure 2-14, Appendix A) <p>Surface occupancy would be prohibited in the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed SDAs • Beechatuda Tongue • Ephemeral Wash Riparian Area • Wetlands, as defined by the US Army Corps of Engineers • Bald eagle core areas 	<p>Summary: OPEN TO LEASING WITH A NO SURFACE OCCUPANCY STIPULATION (all NSOs): Prohibit surface occupancy on 1,037,500 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—681,300 acres • Non-BLM surface/federal mineral estate—356,200 acres (refer to Appendix D and Figure 2-15, Appendix A) <p>Surface occupancy would be prohibited in the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed SDAs • Chacoan roads and outliers mile 2-3 zone/corridor • CCNHP mile 2-4 zone • CIMPPs and historic properties—3,696-foot (0.7 miles) zone • Beechatuda Tongue • Fragile soils • Domestic wells—1,000-foot zone • Active channel, 100-year floodplain, and riparian system (including the Ephemeral Wash Riparian Area)—656-foot (200-meter) zone • Wetlands and seeps/springs—656-foot (200-meter) zone • Designated plant conservation areas • Yellow-billed cuckoo and southwestern willow flycatcher habitat • Mexican spotted owl (MSO) suitable habitat • Federally listed species critical habitat • Bald eagle core areas • Residential, community, municipal, and public structures and buildings—0.25-mile zone 	<p>Summary: OPEN TO LEASING WITH A NO SURFACE OCCUPANCY STIPULATION (all NSOs): Sub-Alternative B1</p> <p>Prohibit surface occupancy on 588,900 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—426,500 acres • Non-BLM surface/federal mineral estate: 162,400 acres (refer to Appendix D and Figure 2-16, Appendix A) <p>Surface occupancy would be prohibited in the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed SDAs • Chacoan roads and outliers mile 3-5 zone/corridor • CIMPPs and historic properties —1.75-mile zone • Beechatuda Tongue • Fragile soils • Active channel, 100-year floodplain, and riparian system (including the Ephemeral Wash Riparian Area)—50-foot zone • Wetlands and seeps/springs—150-foot zone • Yellow-billed cuckoo and southwestern willow flycatcher habitat • MSO suitable habitat • Federally listed species critical habitat • Bald eagle core areas • Residential, community, municipal, and public structures and buildings—0.25-mile zone 	<p>Summary: OPEN TO LEASING WITH A NO SURFACE OCCUPANCY STIPULATION (all NSOs): Sub-Alternative C1</p> <p>Prohibit surface occupancy on 133,900 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—81,800 acres • Non-BLM surface/federal mineral estate—52,100 acres (refer to Appendix D and Figure 2-18, Appendix A) <p>Surface occupancy would be prohibited in the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed SDAs • Chacoan outliers 1-mile zone/Chacoan road ACECs 1-mile corridor/Chacoan roads outside ACECs 1.5-mile corridor • CCNHP 2-mile zone • CIMPPS and historic properties—3,696-foot (0.7 miles) zone • Beechatuda Tongue • Domestic wells—1,000-foot zone • Yellow-billed cuckoo and southwestern willow flycatcher habitat • MSO suitable habitat • Bald eagle core areas • Residential, community, municipal, and public structures and buildings—3,696-foot (0.7 miles) zone • Jackson Lake Wildlife Area <p>Sub-Alternative C2</p> <p>Prohibit surface occupancy on 161,300 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—91,600 acres • Non-BLM surface/federal mineral estate—69,700 acres (refer to Appendix D and Figure 2-19, Appendix A) 	<p>Summary: OPEN TO LEASING WITH A NO SURFACE OCCUPANCY STIPULATION (all NSOs): Prohibit surface occupancy on 41,300 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—38,300 acres • Non-BLM surface/federal mineral estate—3,300 acres (refer to Appendix D and Figure 2-24, Appendix A) <p>Surface occupancy would be prohibited in the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed SDAs • Beechatuda Tongue • Bald eagle core areas • Residences 656-foot (200-meter) zone • Community, municipal, and public structures and buildings—1,000-foot zone

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
				<p>Surface occupancy would be prohibited in the following areas (see rows below for details on each area): Same as Sub-Alternative C1, except CCNHP 4-mile zone</p> <p>Sub-Alternative C3 Prohibit surface occupancy on 195,300 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—105,600 acres • Non-BLM surface/federal mineral estate—89,700 acres (refer to Appendix D and Figure 2-20, Appendix A) <p>Surface occupancy would be prohibited in the following areas (see rows below for details on each area): Same as Sub-Alternative C1, except CCNHP 6-mile zone</p>	
			<p>Sub-Alternative B2 Prohibit surface occupancy on 548,000 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—398,100 acres • Non-BLM surface/federal mineral estate: 149,900 acres (refer to Appendix D and Figure 2-17, Appendix A) <p>Surface occupancy would be prohibited in the following areas (see rows below for details on each area): same as Sub-Alternative B1.</p>	<p>Sub-Alternative C4 Prohibit surface occupancy on 240,900 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—131,500 acres • Non-BLM surface/federal mineral estate—109,400 acres (refer to Appendix D and Figure 2-21, Appendix A) <p>• Surface occupancy would be prohibited in the following areas (see rows below for details on each area): Same as Sub-Alternative C1, except CCNHP 8-mile zone</p>	
				<p>Sub-Alternative C5 Prohibit surface occupancy on 295,800 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—168,200 acres • Non-BLM surface/federal mineral estate—127,600 acres (refer to Appendix D and Figure 2-22, Appendix A) <p>Surface occupancy would be prohibited in the following areas (see rows below for details on each area): Same as Sub-Alternative C1, except CCNHP 10-mile zone</p>	
				<p>Sub-Alternative C6 Prohibit surface occupancy on 156,700 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—92,500 acres • Non-BLM surface/federal mineral estate—64,200 acres (refer to Appendix D and Figure 2-23, Appendix A) 	

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
				Surface occupancy would be prohibited in the following areas (see rows below for details on each area): Same as Sub-Alternative C1, except CCNHP mile 4-6 zone	
109.	<p>Summary: OPEN TO LEASING WITH A CONTROLLED SURFACE USE STIPULATION (all CSUs): Apply CSU restrictions on 1,112,600 acres of the federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—846,100 acres • Non-BLM surface/federal mineral estate—266,500 acres (refer to Appendix D and Figure 2-25, Appendix A) <p>CSU restrictions would be applied in the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed cultural SDAs • Listed paleontological SDAs • Listed recreation SDAs • Ephemeral Wash Riparian Area • Mexican Spotted Owl ACEC • Steep slopes • 100-year floodplain • Clover's cactus and Aztec gilia habitat 	<p>Summary: OPEN TO LEASING WITH A CONTROLLED SURFACE USE STIPULATION (all CSUs): Apply CSU restrictions on 702,700 acres of the federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—554,100 acres • Non-BLM surface/federal mineral estate—148,600 acres (refer to Appendix D and Figure 2-26, Appendix A) <p>CSU restrictions would be applied in the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed cultural SDAs • Listed paleontological SDAs • Listed recreation SDAs • Mexican Spotted Owl ACEC • Steep slopes, benches, and sensitive soils • Gunnison's prairie dog colony—165-foot (50-meter) zone • Special status plant species potential, suitable, and/or occupied habitat • Known special status bat species roosts, hibernacula, or United States Fish and Wildlife Service (USFWS) confirmed special status bat species habitat 	<p>Summary: OPEN TO LEASING WITH A CONTROLLED SURFACE USE STIPULATION (all CSUs):</p> <p>Sub-Alternative B1 Apply CSU restrictions on 900,300 acres of the federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—645,200 acres • Non-BLM surface/federal mineral estate—255,100 acres (refer to Appendix D and Figure 2-27, Appendix A) <p>CSU restrictions would be applied in the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed cultural SDAs • Listed paleontological SDAs • Listed recreation SDAs • Ephemeral Wash Riparian Area • Mexican Spotted Owl ACEC • Steep slopes, benches, and sensitive soils • Domestic wells—1,000-foot zone • Riparian system, wetlands, and seeps/springs—500-foot zone • Gunnison's prairie dog colony—165-foot (50-meter) zone • Special status plant species potential, suitable, and/or occupied habitat • Known special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat <p>Sub-Alternative B2 Apply CSU restrictions on 833,000 acres of federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—590,200 acres • Non-BLM surface/federal mineral estate: 242,800 acres (refer to Appendix D and Figure 2-28, Appendix A) <p>CSU restrictions would be applied in the following areas (see rows below for details on each area): Same as Sub-Alternative B1.</p>	<p>Summary: OPEN TO LEASING WITH A CONTROLLED SURFACE USE STIPULATION (all CSUs):</p> <p>Sub-Alternatives C1–C5 Apply CSU restrictions on 1,141,400 acres of the federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—891,700 acres • Non-BLM surface/federal mineral estate—249,700 acres (refer to Appendix D and Figure 2-29, Appendix A) <p>CSU restrictions would be applied in the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed cultural SDAs • Listed paleontological SDAs • Listed recreation SDAs • Ephemeral Wash Riparian Area • Mexican Spotted Owl ACEC • Steep slopes, benches, sensitive soils, and fragile soils • Gunnison's prairie dog colony boundary • Special status plant species potential, suitable, and occupied habitat • Federally listed species critical habitat • Known special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat <p>Sub-Alternative C6 Apply CSU restrictions on 1,131,800 acres of the federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—888,900 acres • Non-BLM surface/federal mineral estate—242,900 acres (refer to Appendix D and Figure 2-30, Appendix A) <p>CSU restrictions would be applied in the following areas (see rows below for details on each area): Same as Sub-Alternative C1.</p>	<p>Summary: OPEN TO LEASING WITH A CONTROLLED SURFACE USE STIPULATION (all CSUs): Apply CSU restrictions on 1,093,300 acres of the federal mineral estate:</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—841,200 acres • Non-BLM surface/federal mineral estate—252,100 acres (refer to Appendix D and Figure 2-31, Appendix A) <p>CSU restrictions would be applied in the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed cultural SDAs • Listed paleontological SDAs (Torrejon Fossil Fauna ACEC West only) • Mexican Spotted Owl ACEC • Steep slopes, benches, sensitive soils, and fragile soils • Gunnison's prairie dog colony boundary • Special status plant species potential, suitable, and/or occupied habitat

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
110.	<p>Summary: OPEN TO LEASING WITH A TIMING LIMITATION STIPULATION (all TLs): Prohibit surface occupancy and surface-disturbing activities on 316,300 acres of the federal mineral estate (see the specific resource section and Appendix D for dates):</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—256,900 acres • Non-BLM surface/federal mineral estate—59,400 acres that are open to fluid mineral leasing (refer to Appendix D and Figure 2-32, Appendix A) <p>TLs would be applied to the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed SDAs • Seasonal raptor nesting habitat • Golden eagle nest sites • Bald eagle winter areas—Bald Eagle ACEC 	<p>Summary: OPEN TO LEASING WITH A TIMING LIMITATION STIPULATION (all TLs): Prohibit surface occupancy and surface-disturbing activities on 317,400 acres of the federal mineral estate (see the specific resource section and Appendix D for dates):</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—281,400 acres • Non-BLM surface/federal mineral estate—36,000 acres that are open to fluid mineral leasing (refer to Appendix D and Figure 2-33, Appendix A) <p>TLs would be applied to the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed SDAs • Migratory birds • Special status plant species suitable habitat • Raptor nest sites • Golden and bald eagle nest sites • Bald eagle winter areas—Bald Eagle ACEC • Pinyon jay colonial nest sites—3,168-foot (0.6 mile) zone • Burrowing owl nesting habitat 	<p>Summary: OPEN TO LEASING A WITH TIMING LIMITATION STIPULATION (all TLs):</p> <p>Sub-Alternative B1 Prohibit surface occupancy and surface-disturbing activities on 129,900 acres of the federal mineral estate (see the specific resource section and Appendix D for dates):</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—121,100 acres • Non-BLM surface/federal mineral estate—8,800 acres that are open to fluid mineral leasing (refer to Appendix D and Figure 2-34, Appendix A) <p>TLs would be applied to the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • CCNHP peak visitation (including access road) • Listed SDAs • Migratory birds • Raptor nest sites • Golden and bald eagle nest sites (variations by stage) • Bald eagle winter areas—Bald Eagle ACEC • Pinyon jay colonial nest sites—3,168-foot (0.6 mile) zone • Burrowing owl nesting habitat <p>Sub-Alternative B2 Prohibit surface occupancy and surface-disturbing activities on 123,300 acres of the federal mineral estate (see the specific resource section and Appendix D for dates):</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—115,600 acres • Non-BLM surface/federal mineral estate—7,700 acres that are open to fluid mineral leasing (refer to Appendix D and Figure 2-35, Appendix A) <p>TLs would be applied to the following areas (see rows below for details on each area): Same as Sub-Alternative B1</p>	<p>Summary: OPEN TO LEASING WITH A TIMING LIMITATION STIPULATION (all TLs):</p> <p>Sub-Alternatives C1–C6 Prohibit surface occupancy and surface-disturbing activities on 316,300 acres of the federal mineral estate (see the specific resource section and Appendix D for dates):</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—256,900 acres • Non-BLM surface/federal mineral estate—59,400 acres that are open to fluid mineral leasing (refer to Appendix D and Figure 2-36, Appendix A) <p>TLs would be applied to the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed SDAs • Migratory birds • Raptor nest sites • Golden and bald eagle nest sites (variations by stage) • Bald eagle winter areas—Bald Eagle ACEC • Pinyon jay colonial nest sites 1,640-foot (500 meter) zone • Burrowing owl nesting habitat 	<p>Summary: OPEN TO LEASING WITH A TIMING LIMITATION STIPULATION (all TLs): Prohibit surface occupancy and surface-disturbing activities on 3,700 acres of the federal mineral estate (see the specific resource section and Appendix D for dates):</p> <ul style="list-style-type: none"> • BLM surface/federal mineral estate—1,500 acres • Non-BLM surface/federal mineral estate—2,200 acres that are open to fluid mineral leasing (refer to Appendix D and Figure 2-37, Appendix A) <p>TLs would be applied to the following areas (see rows below for details on each area):</p> <ul style="list-style-type: none"> • Listed SDAs (Bald Eagle ACEC only) • Golden and bald eagle nest sites (variations by stage) • Bald eagle winter areas—Bald Eagle ACEC • Pinyon jay colonial nest sites

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
111.	<i>NSO for Specially Designated Areas</i>				
112.	<p>Allowable Use: Apply NSO stipulation OG-A-4 to approximately 47,100 acres in all or part of the SDAs listed below:</p> <p>ACECs listed in 2003 RMP</p> <p>Recreation/Natural/Wildlife Areas</p> <ul style="list-style-type: none"> • Dunes Vehicle Special Recreation Management Area (SRMA) • Head Canyon Motocross Track SRMA • Negro Canyon ERMA <p>Scenic Area: Angel Peak Scenic Area</p>	<p>Allowable Use: Apply NSO stipulation OG-A-4 to approximately 157,900 acres in all or part of the SDAs listed below:</p> <p>ACECs listed in 2003 RMP</p> <p>Recreation/Natural/Wildlife Areas</p> <ul style="list-style-type: none"> • Dunes Vehicle SRMA • Head Canyon Motocross Track SRMA • Negro Canyon ERMA • Rattlesnake Canyon Wildlife Area <p>Scenic Areas: Same as the No Action Alternative</p>	<p>Allowable Use: Sub-Alternatives B1 and B2: Apply NSO stipulation OG-A-4 to approximately 80,800 acres in all or part of the SDAs listed below:</p> <p>ACECs listed in 2003 RMP</p> <p>Recreation/Natural/Wildlife Areas</p> <ul style="list-style-type: none"> • Crow Mesa Wildlife Area • Dunes Vehicle SRMA • Head Canyon Motocross Track SRMA • Negro Canyon ERMA <p>Scenic Areas: Same as the No Action Alternative</p>	<p>Allowable Use: Sub-Alternatives C1–C6: Apply NSO stipulation OG-A-4 to approximately 49,500 acres in all or part of the SDAs listed below:</p> <p>ACECs listed in 2003 RMP</p> <p>Recreation/Natural/Wildlife Areas</p> <ul style="list-style-type: none"> • Crow Mesa Wildlife Area • Dunes Vehicle SRMA • Head Canyon Motocross Track SRMA • Negro Canyon ERMA <p>Scenic Areas: Same as the No Action Alternative</p>	<p>Allowable Use: Apply NSO stipulation OG-A-4 to approximately 37,300 acres in all or part of the SDAs listed below:</p> <p>ACECs listed in 2003 RMP</p> <p>Recreation/Natural/Wildlife Areas</p> <ul style="list-style-type: none"> • Dunes Vehicle SRMA • Head Canyon Motocross Track SRMA • Negro Canyon ERMA <p>Scenic Area: Angel Peak Scenic Area</p>
113.	<i>NSO for Cultural Resources</i>				
114.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Apply NSO-1 from miles 2 to 3 around designated Chacoan roads (including those in and outside of ACECs) and outliers.</p>	<p>Allowable Use: Apply NSO-2 from miles 3 to 5 around designated Chacoan roads (including those in and outside of ACECs) and outliers.</p>	<p>Allowable Use: Apply NSO-3 for 1 mile around Chacoan outliers, other than Pueblo Pintado and Kin Bineola, for 0.5 miles on either side of the ACEC boundary for Chacoan road ACECs, including the North Road ACEC and Ah-shi-sle-pah Road ACEC, and for 0.75 miles on either side of the center line of designated Chacoan roads that are not in ACECs.</p>	<p>Allowable Use: No similar action.</p>
115.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Apply NSO-1 from miles 2 to 4 around the CCNHP boundary,</p>	<p>Alternative B1 Allowable Use: No similar action.</p> <p>Sub-Alternative B2 Allowable Use: No similar action.</p>	<p>Sub-Alternative C1 Allowable Use: Apply NSO-4 for 2 miles around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola.</p> <p>Sub-Alternative C2 Allowable Use: Apply NSO-5 for 4 miles around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola.</p> <p>Sub-Alternative C3 Allowable Use: Apply NSO-6 for 6 miles around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola.</p> <p>Sub-Alternative C4 Allowable Use: Apply NSO-7 for 8 miles around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola.</p> <p>Sub-Alternative C5 Allowable Use: Apply NSO-8 for 10 miles around the CCNHP</p>	<p>Allowable Use: No similar action.</p>

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
				boundary and the boundaries of Pueblo Pintado and Kin Bineola. Sub-Alternative C6 Allowable Use: Apply NSO-9 for miles 4 to 6 around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola.	
116.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Apply NSO-10 within 3,696 feet (0.7 miles) of CIMPPs and historic properties for which setting or feeling are important aspects of integrity.	Allowable Use: Apply NSO-11 within 1.75 miles of CIMPPs and historic properties for which setting or feeling are important aspects of integrity.	Allowable Use: Same as Alternative A.	Allowable Use: No similar action.
117.	<i>NSO for Geologic Resources</i>				
118.	Allowable Use: Apply NSO F-23 on Beechatuda Tongue on portions of T. 30 N., R. 15 W., Section 5: NW1/4 (100 acres), to preserve the unit to be studied for stratigraphic nomenclature and to preserve the unique geological formation.				
119.	<i>NSO for Soil Resources</i>				
120.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Apply NSO NSO-12 on fragile soils.		Allowable Use: No similar action. See CSU section.	
121.	<i>NSO for Water Resources</i>				
122.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Apply NSO-13 within 1,000 feet (0.2 miles) of all domestic water wells or community water sources, including those that have not been permitted by the State of New Mexico. Directional drilling may be prohibited to protect water quality, depending on site-specific analysis.	Allowable Use: No similar action. See CSU section.	Allowable Use: Same as Alternative A.	Action: No similar action.
123.	<i>NSO for Vegetation</i>				
124.	Allowable Use: Apply NSO-14 on active floodplains in the Ephemeral Wash Riparian Area to protect riparian systems and facilitate attainment and maintenance of PFC.	Allowable Use: Apply NSO-15 in active channel, 100-year floodplain, and 656-foot (200-meter) zone around the outside boundary of all 100-year floodplains and riparian systems, including the Ephemeral Wash Riparian Area.	Allowable Use: Apply NSO-16 in active channel, 100-year floodplain, and 150-foot zone around the outside boundary of all 100-year floodplains and riparian systems, including but not limited to the Ephemeral Wash Riparian Area.	Allowable Use: No similar action.	
125.	Allowable Use: Apply NSO-17 in wetland areas (as defined in the Corps of Engineers Wetlands Delineation Manual [USACE 1987]).	Allowable Use: Apply NSO-18 within 656 feet (200 meters) of the delineated boundary or ordinary high water mark of known and newly discovered wetlands and natural seeps/springs. A 500-foot minimum casing length is required for all wells. Directional drilling may be prohibited to protect water quality beneath wetlands or seeps/springs, depending on site-specific analysis.	Allowable Use: Apply NSO-19 within 150 feet of the delineated boundary or ordinary high water mark of known and newly discovered wetlands and natural seeps/springs. A 500-foot minimum casing length is required for all wells.	Allowable Use: No similar action.	
126.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Apply NSO-20 in 6,800 acres of designated plant conservation areas.	Allowable Use: No similar action.		
127.	<i>NSO for Special Status Species</i>				
128.	Allowable Use: No similar action in current RMP. See River Tracts ACEC in the 2003 RMP.	Allowable Use: Apply NSO-21 in identified potential yellow-billed cuckoo and southwest willow flycatcher nesting habitat.			Allowable Use: No similar action.

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
129.	Allowable Use: No similar action in the 2003 RMP. See CSU stipulation for Mexican Spotted Owl ACEC.	Allowable Use: Apply NSO-22 in all MSO suitable habitat (i.e., mixed conifer forests, pine-oak woodlands, and shady wooded canyons) in the Mexican Spotted Owl ACEC.			Allowable Use: Same as the No Action Alternative.
130.	Allowable Use: No similar action in the 2003 RMP. Section 7 consultation is conducted as needed; mitigation, such as minimization, avoidance, and mitigation, may be required as a result.	Allowable Use: Apply NSO-23 in all designated and proposed critical habitat for federally listed species.		Allowable Use: No similar action. See CSU section.	Allowable Use: No similar action. ESA Section 7 consultation will be conducted as needed; mitigation, such as minimization, avoidance, and mitigation, may be required as a result.
131.	Allowable Use: Apply NSO-24 in the core areas of Bald Eagle ACEC.				
132.	<i>NSO for Communities</i>				
133.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Apply NSO-25 within 1,320 feet (0.25 miles) of any house, barn, occupied dwelling, structure on a home site lease, or building unit (including those structures occupied intermittently or seasonally) or other community, municipal, and public structures and buildings, such as chapter houses and schools, and other sensitive receptors, as defined by the EPA. NSO may be adjusted, based on site-specific conditions.		Allowable Use: Apply NSO-26 within 3,696 feet (0.7 miles) of any house, barn, occupied dwelling, structure on a home site lease, or building unit (including those structures occupied intermittently or seasonally) or other community, municipal, and public structures and buildings, such as chapter houses and schools, and other sensitive receptors, as defined by the EPA. NSO setback may be adjusted, based on site-specific conditions.	Allowable Use: Apply NSO-27 within 656 feet (200 meters) of any house, barn, occupied dwelling, structure on a home site lease, or building unit (including those structures occupied intermittently or seasonally) or within 1,000 feet of other community, municipal, and public structures and buildings, such as chapter houses and schools, and other sensitive receptors, as defined by the EPA. NSO may be adjusted, based on site-specific conditions.
134.	<i>NSO for State Parks and Wildlife Areas</i>				
135.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: No similar action. See closures section.		Allowable Use: Apply NSO-28 in Jackson Lake Wildlife Area.	Allowable Use: No similar action.
136.	<i>CSU for Specially Designated Areas</i>				
137.	Allowable Use: Apply CSU-1 to approximately 24,300 acres, in all or part of the seven cultural ACECs listed in the 2003 RMP.				
138.	Allowable Use: Apply CSU F-9 to approximately 123,600 acres, in all or part of the paleontological SDAs listed below. <ul style="list-style-type: none"> • Bettonie Tsosie Fossil Area • Bohannon Canyon Fossil Complex • Carson Fossil Pocket • Gobernador and Cereza Canyon Fossil Area • Kutz Canyon Fossil Area • Lybrook Fossil Area • Piñon Mesa Fossil Area • Torrejon Fossil Fauna ACEC West (the eastern portion of this ACEC is in the Rio Puerco Field Office [RPFO]) 				Allowable Use: Apply CSU F-9 to approximately 600 acres, in all or part of the paleontological SDA listed below: <ul style="list-style-type: none"> • Torrejon Fossil Fauna ACEC West (eastern portion of this ACEC is in RPFO)
139.	Allowable Use: Apply CSU-2 to approximately 45,200 acres, in all or part of the recreation SDAs listed in the 2003 RMP.				
140.	Allowable Use: Apply CSU-3 in Ephemeral Wash Riparian Area.	Allowable Use: No similar action. See NSO section.	Allowable Use: Same as the No Action Alternative.		Allowable Use: No similar action.
141.	Allowable Use: Apply CSU-4 in Mexican Spotted Owl ACEC. The Bald Eagle ACEC was identified as being subject to a CSU stipulation in the 2003 RMP, but a CSU stipulation was never developed. This is because the NSO and TL stipulations are all that are needed to address resource concerns in this area.				

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142.	<p>Allowable Use: Apply F-45-CSU to approximately 347,800 acres in all, or portions of, the wildlife SDAs listed below:</p> <ul style="list-style-type: none"> • Carracas Mesa ERMA/Wildlife Area • Cereza Canyon Wildlife Area • Crow Mesa Wildlife Area • East La Plata Wildlife Area • Ensenada Mesa Wildlife Area • Gonzales Mesa Wildlife Area • Laguna Seca Mesa Wildlife Area • Middle Mesa Wildlife Area • Rattlesnake Canyon Wildlife Area • Rosa Mesa Wildlife Area • Thomas Canyon ERMA/Wildlife Area 	<p>Allowable Use: Apply CSU-5 to approximately 9,200 acres in all, or portions of, the wildlife SDAs listed below:</p> <ul style="list-style-type: none"> • Laguna Seca Mesa Wildlife Area • Rattlesnake Canyon Wildlife Area <p>See closure and NSO sections for other wildlife SDAs.</p>	<p>Sub-Alternatives B1 and B2 Allowable Use: Apply CSU-5 to approximately 141,500 acres in all, or portions of, the wildlife SDAs listed below:</p> <ul style="list-style-type: none"> • Crow Mesa Wildlife Area • Laguna Seca Mesa Wildlife Area • Rattlesnake Canyon Wildlife Area <p>See closure and NSO sections for other wildlife SDAs.</p>	<p>Sub-Alternatives C1–C6 Allowable Use: Apply CSU-5 to approximately 321,800 acres in all, or portions of, the wildlife SDAs listed below:</p> <ul style="list-style-type: none"> • Cereza Canyon Wildlife Area • Crow Mesa Wildlife Area • Ensenada Mesa Wildlife Area • Gonzales Mesa Wildlife Area • Laguna Seca Mesa Wildlife Area • Middle Mesa Wildlife Area • Rattlesnake Canyon Wildlife Area • Rosa Mesa Wildlife Area <p>See closure section for other wildlife SDAs.</p>	<p>Allowable Use: No similar action.</p>
143.	<i>CSU for Soil Resources</i>				
144.	<p>Allowable Use: Apply CSU stipulation F-46-CSU on slopes 15 percent and greater and/or side hill cuts of more than 3 feet vertical. Maximum grade on collector and arterial roads is 8 percent (except pitch grades not exceeding 300 feet in length and 10 percent in grade).</p>	<p>Allowable Use: Apply CSU-6 on slopes 15 percent and greater or on side hill cuts of more than 3 feet vertical, on sensitive soils, such as Badland soils and biological soil crust communities, and on pristine benches (exposed sandstone mesas).</p>		<p>Allowable Use: Apply CSU-7 on slopes 15 percent and greater and/or on side hill cuts of more than 3 feet vertical, on sensitive soils, such as Badland soils and biological soil crust communities, on fragile soils, and on pristine benches (exposed sandstone mesas).</p>	
145.	<i>CSU for Water Resources</i>				
146.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: No similar action. See NSO section.</p>	<p>Allowable Use: Apply CSU-8 within 1,000 feet of all domestic water wells or community water sources.</p>	<p>Allowable Use: No similar action. See NSO section.</p>	<p>Allowable Use: No similar action.</p>
147.	<i>CSU for Vegetation</i>				
148.	<p>Allowable Use: Apply CSU-9 in the 100-year floodplain.</p>	<p>Allowable Use: No similar action. See NSO section.</p>	<p>Allowable Use: Apply CSU-10 up to 500 feet from the outside edge of the NSO around the riparian system, including the Ephemeral Wash Riparian Area, and known and newly discovered wetlands and natural seeps/spring. This is to protect riparian systems, given channel migration, and to facilitate attainment and maintenance of PFC in the 100-year floodplain. Avoid placing roads or pipelines in or through banks and channels, in order to reduce erosion and prevent migration of channel onto well sites.</p>	<p>Allowable Use: No similar action.</p>	
149.	<i>CSU for Special Status Species</i>				
150.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Apply CSU-11 within 165 feet (50 meters) of active Gunnison’s prairie dog colony boundaries.</p>		<p>Allowable Use: Apply CSU-12 within the boundary of active Gunnison’s prairie dog colonies.</p>	

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
151.	Allowable Use: Apply CSU-13 in Clover’s cactus and Aztec gilia habitat to protect special status plant habitat by requiring biological surveys and potential project relocation.	Allowable Use: Apply CSU-14 in and next to potential, suitable, or occupied habitat for special status plant species to protect habitat. Require surveys and, if special status plant species are identified within the project boundary, require avoidance, minimization of disturbance, and/or other operational constraints.	Allowable Use: Apply CSU-15 in and adjacent to potential, suitable, and/or occupied habitat for special status plant species to protect habitat. Require biological surveys and potential project relocation.		
152.	Allowable Use: No similar action in the 2003 RMP. ESA Section 7 consultation is conducted, as needed; mitigation, such as minimization, avoidance, and mitigation may be required as a result.	Allowable Use: No similar action. See NSO section.	Allowable Use: Apply CSU-16 in all designated and proposed critical habitat for federally listed species.		Allowable Use: No similar action. Conduct ESA Section 7 consultation, as needed; minimization, avoidance, and mitigation may be required as a result.
153.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Apply CSU-17 within known special status bat species habitat.			Allowable Use: No similar action.
154.	<i>TL for Cultural Resources</i>				
155.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: No similar action.	Allowable Use: Apply TL-1 to prohibit construction, drilling, well completions, and/or workover rigs for 1 mile on either side of the main entrance road into the CCNHP (i.e., County Road 7950) during peak visitation times, from April through October. Additional TLs on activities in this area could be identified through Section 106 consultation.	Allowable Use: No similar action.	
156.	<i>TL for Wildlife</i>				
157.	Allowable Use: Apply TL-2 on 328,400 acres (Map 2-11; ROD, 5), in the areas listed in Table 1 (RMP). Areas with TLs (RMP, 2-6 to 2-7), as follows: <ul style="list-style-type: none"> • Bald Eagle ACEC, November 1 to March 31. Protect important wintering wildlife habitat (restriction zones around bald eagle use areas) • Cereza Canyon Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) • Crow Mesa Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) • East La Plata Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) • Ensenada Mesa Wildlife Area, May 1 to July 15. Protect important seasonal wildlife habitat (antelope fawning range) • Gonzales Mesa Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) 	Allowable Use: Apply TL-2 on 117,100 acres in the following areas: <ul style="list-style-type: none"> • Bald Eagle ACEC, November 1 to March 31. Protect important wintering wildlife habitat (restriction zones around bald eagle use areas) • East La Plata Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range). May 1 to July 15. Protect important seasonal wildlife habitat (antelope fawning range) • Laguna Seca Mesa Wildlife Area, December 1 to June 15. Protect important seasonal wildlife habitat (big game winter range) • Raptor nest sites, March 1 to June 30. Protect important seasonal wildlife habitat (bird of prey nests) • Rattlesnake Canyon Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) 	Sub-Alternatives B1 and B2 Allowable Use: Apply TL-2 on 167,700 acres in the following areas: <ul style="list-style-type: none"> • Bald Eagle ACEC, November 1 to March 31. Protect important wintering wildlife habitat (restriction zones around bald eagle use areas) • Crow Mesa Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) • East La Plata Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range). May 1 to July 15. Protect important seasonal wildlife habitat (antelope fawning range) • Laguna Seca Mesa Wildlife Area, December 1 to June 15. Protect important seasonal wildlife habitat (big game winter range) • Raptor nest sites, March 1 to June 30. 	Sub-Alternatives C1–C6 Allowable Use: Apply TL-2 on 328,400 acres in the following areas: <ul style="list-style-type: none"> • Bald Eagle ACEC, November 1 to March 31. Protect important wintering wildlife habitat (restriction zones around bald eagle use areas) • Cereza Canyon Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) • Crow Mesa Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) • East La Plata Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range). May 1 to July 15. Protect important seasonal wildlife habitat (antelope fawning range) • Ensenada Mesa Wildlife Area, May 1 to July 15. Protect important seasonal wildlife habitat (antelope fawning range) • Gonzales Mesa Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) • Laguna Seca Mesa Wildlife Area, December 1 to 	Allowable Use: Apply TL-2 on 9,900 acres in the following area: <ul style="list-style-type: none"> • Bald Eagle ACEC, November 1 to March 31. Protect important wintering wildlife habitat (restriction zones around bald eagle use areas) • East La Plata Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range). May 1 to July 15. Protect important seasonal wildlife habitat (antelope fawning range)

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
	<ul style="list-style-type: none"> Laguna Seca Mesa Wildlife Area, December 1 to June 15. Protect important seasonal wildlife habitat (big game winter range) Middle Mesa Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) Raptor nest sites, March 1 to June 30. Protect important seasonal wildlife habitat (bird of prey nests) Rattlesnake Canyon Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) Rosa Mesa Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) Rosa Mesa Wildlife Area: Designated habitat, December 1 to July 15. Protect important seasonal wildlife habitat (elk calving) 		<p>Protect important seasonal wildlife habitat (bird of prey nests)</p> <ul style="list-style-type: none"> Rattlesnake Canyon Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) 	<p>June 15. Protect important seasonal wildlife habitat (big game winter range)</p> <ul style="list-style-type: none"> Middle Mesa Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) Raptor nest sites, March 1 to June 30. Protect important seasonal wildlife habitat (bird of prey nests) Rattlesnake Canyon Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) Rosa Mesa Wildlife Area, December 1 to March 31. Protect important seasonal wildlife habitat (big game winter range) Rosa Mesa Wildlife Area: Designated habitat, December 1 to July 15. Protect important seasonal wildlife habitat (elk calving) 	
158.	<p>Allowable Use: No similar action in the 2003 RMP. Compliance with the Migratory Bird Treaty Act is required.</p>	<p>Allowable Use: Apply TL-3 to proposed projects that would disturb 4.0 acres or more. No construction from May 15 to July 31 would be permitted without a migratory bird nest survey. These surveys would be conducted by a BLM FFO-authorized officer, using a survey protocol provided by a BLM Authorized Officer. If any active nests are located in the proposed project area, construction would not be allowed until written consent is received from the BLM Authorized Officer. If construction is allowed when the nests identified in the survey are still active, the BLM may require monitoring, and construction may be required to stop if it is determined to be disrupting the nest.</p>			<p>Allowable Use: No similar action. Compliance with the Migratory Bird Treaty Act will be required.</p>
159.	<p><i>TL for Special Status Species</i></p>				
160.	<p>Allowable Use: Apply TL stipulation F-1 TL during seasonal raptor nesting periods.</p> <ul style="list-style-type: none"> Ferruginous hawk—0.33 miles (March 1 to June 30) Prairie falcon—0.33 miles (March 1 to June 30) Peregrine falcon—0.33 miles (March 1 to June 30) 	<p>Allowable Use: Apply TL-4 during seasonal raptor nesting periods. Raptor nesting sites, both active and historical, will be avoided by the distances and seasonal periods listed below. This stipulation does not apply to operation and maintenance of production facilities, except for when operation and maintenance of wells, production, and associated facilities is determined to have a negative impact on the nesting behavior of the raptors.</p> <ul style="list-style-type: none"> Ferruginous hawk—0.33 miles (March 1 to June 30) Prairie falcon—0.33 miles (March 1 to June 30) Peregrine falcon—0.33 miles (March 1 to June 30) Osprey—0.25 miles (during the nesting/rearing stage: April 1 to August 31) <p>Noise from oil and gas equipment that operates on continuously for more than 8 hours/day on a long-term basis and that is more than 1 week in duration will be kept at or below 48.6 dBA at specified locations. This is to minimize disturbances to nest sites for ferruginous hawks and prairie falcons.</p>			<p>Allowable Use: No similar action. Compliance with the Migratory Bird Treaty Act is required.</p>
161.	<p>Allowable Use: Apply TL stipulation F1 to prohibit surface use from February 1 to June 30 within 0.5 miles of raptor nest sites for the protection of important seasonal wildlife habitat (bird of prey nests). This stipulation may apply to operation and maintenance of production facilities, if determined that the operation and/or maintenance activity negatively impacts the nesting behavior of the raptor. Exceptions may apply, depending on the level of disturbance and nesting chronology of the</p>	<p>Allowable Use: Apply TL-5 to prohibit construction, drilling, completion, and workover from January 1 to June 30 within 0.5 miles of golden and bald eagle nest sites.</p> <p>Additional requirements may apply, depending on project type and impacts on nesting eagles. This stipulation may apply to operation and maintenance of production facilities, if determined that the operation and/or maintenance negatively affect the nesting</p>	<p>Allowable Use: Apply TL-6 to prohibit construction, drilling, completion, and workover from January 1 to June 30 within 0.5 miles of golden and bald eagle nest sites. Surface-disturbing activities occurring outside of the breeding season (seasonal restriction zone), but within the spatial restriction zone, would be allowed, as long as the activity would not cause the nest site to become unsuitable for future nesting, as determined by a BLM FFO-authorized officer. Facilities and other permanent structures would be allowed if they meet the above criteria. This stipulation does not apply to operation and maintenance of production facilities.</p> <p>Courtship/nest building and egg laying/incubation stage: No construction, drilling, or completion would be allowed within 0.5 miles of an active or historical nest during the courtship/nest building and egg laying/incubation stage, from January 1 to March 30. The 0.5-mile restriction zone would mostly pertain to oil and gas drilling operations.</p> <p>Nestling/rearing stage: No construction, drilling, workover, or completion would be allowed within 0.33 miles of an active or historical nest from April</p>		

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
	<p>breeding pair.</p> <p>No construction, drilling, or completion activities shall be conducted from February 1 to June 30 in a radius of 0.5 miles around active and historical golden eagle nest sites.</p>	<p>behavior of the raptor.</p>	<p>1 to June 30.</p>		
162.	<p>Allowable Use: Apply TL stipulation F-3 TL to prohibit surface use from November 1 to March 31 in the Bald Eagle ACEC (37 units, totaling 4,141 acres), for the protection of important seasonal wildlife habitat (restriction zones around bald eagle use areas). Within restriction zones are areas of intensive bald eagle use, such as roost sites, where any surface-disturbing activity is prohibited year-round. This stipulation does not apply to operation and maintenance of production facilities (ROD, B-2).</p>	<p>Allowable Use: Apply TL-7 to prohibit construction, drilling, completion, and workovers from November 1 through March 31 in the Bald Eagle ACEC. A year-round noise restriction also applies. Continuous noise sources may not exceed 48.6 dBA, as measured at the boundary of the core areas in the ACEC. If after the environmental analysis, it is determined that stricter noise standards are necessary, then the BLM may work with the operator on a case-by-case basis to achieve an acceptable level of noise mitigation. This stipulation does not apply to operation and maintenance of production facilities or emergency situations.</p>			
163.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Apply TL-8 to prohibit construction, drilling, completion, and workover activities within 3,168 feet (0.6 miles) of active pinyon jay colonial nest sites from March 1 to August 1. Noise levels should not exceed 48.6 dBA at the edge of the active nesting colony during this time period. This stipulation does not apply to operation and maintenance of production facilities or emergency situations, unless otherwise specified. Surveys for pinyon jay colonies would be conducted prior to construction. Any future recommended conservation measures developed for the pinyon jay by the USFWS will be incorporated into the RMP.</p>	<p>Allowable Use: Apply TL-9 to prohibit construction, drilling, completion, and workover activities within 1,640 feet (500 meters) of active pinyon jay colonial nest sites from March 1 to August 1. Noise levels should not exceed 48.6 dBA at the edge of the active nesting colony during this time period. This stipulation does not apply to operation and maintenance of production facilities or emergency situations, unless otherwise specified. Surveys for pinyon jay colonies would be conducted prior to construction. Any future recommended conservation measures developed for the pinyon jay by the USFWS will be incorporated into the RMP.</p>	<p>Allowable Use: Apply TL-10 to prohibit construction, drilling, completion, and workover activities within active pinyon jay colonial nest sites from March 1 to August 1. Noise levels should not exceed 48.6 dBA at the edge of the active nesting colony during this time period. This stipulation does not apply to operation and maintenance of production facilities or emergency situations, unless otherwise specified. Surveys for pinyon jay colonies would be conducted prior to construction. Any future recommended conservation measures developed for the pinyon jay by the USFWS will be incorporated into the RMP.</p>	
164.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Apply TL-11 in designated potential burrowing owl nesting habitat. A survey for burrowing owls is required for a proposed project in designated potential nesting habitat from April 1 to August 15. Occupied burrowing owl nests should not be disturbed within a 165-foot radius from April 1 to August 15. This stipulation does not apply to operation and maintenance of production facilities.</p>			<p>Allowable use: No similar action.</p>
165.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Apply TL-12 to prohibit surface construction or ground disturbance within 330 feet of suitable special status plant species habitat when the species is most sensitive, such as during blooming and fruiting/seeding periods. This stipulation does not apply to facilities operation and maintenance.</p>	<p>Allowable Use: No similar action.</p>		

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
166.	LANDS AND REALTY				
167.	GOAL: Implement lands and realty laws, rules, regulations, and policies to facilitate LUAs and land tenure adjustments. Ensure that resources are available for appropriate uses by present and future generations.				
168.	Objective: The objective of the FFO lands program is to facilitate the acquisition, exchange, sale, or conveyance of public lands in order to provide the most efficient management of public resources. The program is responsible for processing land withdrawals, granting ROWs and easements on public lands, and acquiring easements on non-public lands, where necessary. The lands program also issues leases and patents under the R&PP Act and licenses and permits for specific uses, such as filming or special events. All land adjustment actions must go through the NEPA process.	Objective: Respond to internal and external requests for LUAs and consider land tenure adjustments (e.g., issuing ROWs, grants, leases, patents, permits, and licenses, acquisition, exchange, withdrawal, retention, sale, and conveyance of public lands), while controlling unauthorized use. Reduce threats to resources from natural or human-caused deterioration or potential conflict with oil and gas, commercial, private, public, community, and other activities by emphasizing appropriate current mitigation measures, design features, stipulations (COAs, if applicable), and BMPs to protect the quality and resiliency of renewable and nonrenewable resources.			
169.	Allowable Use: LUA-MA-3. To the extent possible, new ROWs would be located within or parallel to existing ROWs or ROW corridors to minimize resource impacts (RMP, 2-11).	Allowable Use: New ROWs are required to follow existing disturbance, which may include roads, utility ROWs and pipelines, and corridors, to reduce disturbance and minimize habitat fragmentation. Exceptions would be applied in areas where following existing disturbance is determined infeasible by the BLM Authorized Officer.	Allowable Use: New ROWs are required to follow existing ROWs or disturbance areas, unless following existing disturbance would cause greater impacts on resources than an alternate route. Examples of existing disturbance areas include access roads, pipelines, utility lines, and ROW corridors.		
170.	Action: LT-MA-20. Continue a prevention program developed by the BLM, the Navajo Nation, and the BIA to prevent unauthorized occupation (RMP, 2-9).				
171.	Action: LUA-MA-2. New oil and gas wells would be sited outside ROW corridors (ROD, 6).				
172.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Require collocation of wells on existing well pads in sensitive wildlife areas.	Allowable Use: Require collocation of wells on existing well pads in wildlife area SDAs.	Allowable Use: No similar action.	
173.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Remote telemetry of well data and piping of produced water would be required, where feasible, to reduce the number of vehicle visits to wells, in order to reduce disturbance to wildlife and reduce road kills. It would also reduce the amount of dust, potential increased sedimentation, and disruption of livestock operations and recreation.	Allowable Use: Same as Alternative A, plus require remote telemetry of wells. Operators developing wells within 10 miles of CCNHP are required to use a liquids gathering systems and off-site facilities.	Allowable Use: Same as Alternative A, plus require remote telemetry of wells.	Allowable Use: Same as Alternative A, plus promote remote telemetry of wells.
174.	Action: No similar action in the 2003 RMP.	Action: Require companies to reuse produced water and flow back water in oil and gas development, when feasible, as determined by the BLM Authorized Officer.	Action: Encourage companies to reuse produced water and flow back water in oil and gas development.		
175.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: To protect paleontological resources, ROWs are subject to the following requirements: <ul style="list-style-type: none"> • Restrict vehicles to existing roads and trails. • A pedestrian survey must be conducted for paleontological material, using a qualified permitted paleontologist determined by the BLM, as part of the permit application for the proposed lease activity in geologic units that are classified on the BLM's Potential Fossil Yield Classification (PFYC) scale as a PFYC U – unknown, 4, and 5, or as determined by the BLM Authorized Officer. The survey and report will be used to determine the presence of paleontological material exposed at the surface, and if necessary, the appropriate mitigation of ground-disturbing activities such as monitoring, avoidance, or project redesign. • Immediately notify the BLM Authorized Officer of any paleontological resources discovered as a result of approved surface-disturbing operations. The lessee must suspend all activities in the vicinity of 			

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		<p>such discovery until notified to proceed by the BLM Authorized Officer and must protect the discovery from damage or looting. The BLM Authorized Officer will evaluate, or will have evaluated, such discoveries after being notified and will determine, after consultation with the operator and the BLM regional paleontologist, the appropriate measures to mitigate adverse effects on significant paleontological resources. On approval of the BLM Authorized Officer, the applicant would be allowed to continue construction through the site, or would be given the choice of either:</p> <ul style="list-style-type: none"> ○ Following the BLM Authorized Officer’s instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource ○ Following the BLM Authorized Officer’s instructions for mitigating impacts on the fossil resource before continuing construction in the project area. The lessee would be responsible for any cost associated for mitigating paleontology resources discovered as a result of the activities. <ul style="list-style-type: none"> • An avoidance zone around all recorded fossil localities may be applied, based on known extent of resources. • When avoidance is not possible, appropriate mitigation may include excavation or collection (data recovery), stabilization, monitoring, protective barriers, and signs. • Project or ground-disturbing activities may be relocated, based on the results of the paleontology field survey. 			
176.	LANDS AND REALTY—ROW EXCLUSION AREAS				
177.	<p>Summary: All ROW applications would continue to receive environmental review on a case-by-case basis.</p> <p>To the extent possible, new ROWs would be located within or parallel to existing ROWs or ROW corridors, to minimize resource impacts. ROW corridors identified by the 2002 Western Utility Group (WUG 2002) revision of the 1992 Western Regional Corridor Study (WUG 1992) are designated for power line and pipeline use. Specific proposals would require site-specific environmental analysis and compliance with established permitting processes. Activities generally excluded from ROW corridors include salable minerals sales, range and wildlife habitat improvements involving surface disturbance and facility construction, campgrounds and public recreational facilities, and other facilities that would attract public use. New oil and gas wells would be sited outside these designated ROW corridors.</p>	<p>Summary: ROW EXCLUSION AREAS: Manage 28,800 acres of BLM-managed surface lands as exclusion areas that are closed to ROWs except in ROW corridors designated under this alternative (Figure 2-38, Appendix A):</p> <ul style="list-style-type: none"> • The Fossil Forest • Lands withdrawn from mineral entry • Lands managed to protect wilderness characteristics as a priority over other multiple uses (existing ROWs could be reauthorized) • Designated plant conservation areas 	<p>Summary: ROW EXCLUSION AREAS: Manage 24,800 acres of BLM-managed surface lands as exclusion areas that are closed to ROWs except in ROW corridors designated under this alternative (Figure 2-39, Appendix A):</p> <ul style="list-style-type: none"> • Mudstone areas • The Black Place • The Fossil Forest • Lands withdrawn from mineral entry • Lands managed to protect wilderness characteristics as a priority over other multiple uses (existing ROWs could be reauthorized) 	<p>Summary: ROW EXCLUSION AREAS: Manage 2,800 acres of BLM-managed surface lands as exclusion areas that are closed to ROWs except in ROW corridors designated under this alternative (Figure 2-40, Appendix A):</p> <ul style="list-style-type: none"> • The Fossil Forest • Lands withdrawn from mineral entry 	<p>Summary: ROW EXCLUSION AREAS: Manage 2,800 acres of BLM-managed surface lands as exclusion areas that are closed to ROWs except in ROW corridors designated under this alternative (Figure 2-40, Appendix A):</p> <ul style="list-style-type: none"> • The Fossil Forest • Lands withdrawn from mineral entry
178.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: No similar action.	Allowable Use: Manage mudstone areas as ROW exclusion.	Allowable Use: No similar action.	
179.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: No similar action. See ROW avoidance section.	Allowable Use: Manage the Black Place as an ROW exclusion area.	Allowable Use: No similar action. See ROW avoidance section.	
180.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Manage the Fossil Forest as an ROW exclusion area.			
181.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Manage lands withdrawn from mineral entry as ROW exclusion areas.			
182.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Lands managed to protect wilderness characteristics as a priority over other multiple uses would be managed as ROW exclusion areas. Existing ROWs may be reauthorized on a case-by-case basis.		Allowable Use: No similar action.	
183.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Manage designated plant conservation areas as ROW exclusion.	Allowable Use: No similar action.		

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
184.	LANDS AND REALTY—ROW AVOIDANCE AREAS				
185.	<p>Summary: All ROW applications would continue to receive environmental review on a case-by-case basis.</p> <p>To the extent possible, new ROWs would be located within or parallel to existing ROWs or ROW corridors, to minimize resource impacts. ROW corridors identified by the 2002 Western Utility Group (WUG 2002) revision of the 1992 Western Regional Corridor Study (WUG 1992) are designated for power line and pipeline use. Specific proposals would require site-specific environmental analysis and compliance with established permitting processes. Activities generally excluded from ROW corridors include salable mineral sales, range and wildlife habitat improvements involving surface disturbance and facility construction, campgrounds and public recreational facilities, and other facilities that would attract public use. New oil and gas wells would be sited outside these designated ROW corridors.</p>	<p>Summary: ROW AVOIDANCE AREAS: Manage 1,060,400 acres of BLM-managed surface lands as ROW avoidance areas except in ROW corridors designated under this alternative (Figure 2-38, Appendix A):</p> <ul style="list-style-type: none"> • CCNHP 4-mile zone • 3-mile zone around Chacoan roads and outliers • Hardwood trees, ponderosa pine, Douglas-fir, aspen • Riparian system active channel, 100-year floodplain—656-foot (200-meter) zone (including the Ephemeral Wash Riparian Area) • Wetlands and seeps/springs—656-foot (200-meter) zone • Special status or listed plant species • Eagle nests • Raptor nest sites • Burrowing owl nesting habitat • Pinyon jay colonial nest sites—3,168-foot (0.6 miles) zone • Gunnison’s prairie dog colony—165-foot (50-meter) zone • Migratory bird nests • Known special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat • The Black Place • Within 3,696 feet (0.7 miles) of CIMPPs and historic properties eligible under the National Register of Historic Places (NRHP) for which setting or feeling are important aspects of integrity • Fragile soils • Slopes greater than 15 percent • Public water supply intakes • Within 0.25 miles of residential, community, municipal, and public structures and buildings 	<p>Summary: ROW AVOIDANCE AREAS: Manage 956,100 acres of BLM-managed surface lands as ROW avoidance areas except in ROW corridors designated under this alternative (Figure 2-39, Appendix A):</p> <ul style="list-style-type: none"> • CCNHP 10-mile zone • 5-mile zone around Chacoan roads and outliers • 1-mile on either side of the main entrance road to CCNHP (i.e., County Road 7950) • Hardwood trees, ponderosa pine, Douglas-fir, aspen • Riparian system active channel, 100-year floodplains, and 150-foot zone (including the Ephemeral Wash Riparian Area) • Wetlands and seeps/springs—150-foot zone • Special status or listed plant species • Eagle nests (variations by stage) • Raptor nest sites • Burrowing owl nesting habitat • Pinyon jay colonial nest site—3,168-foot (0.6 miles) zone • Gunnison’s prairie dog colony—165-foot (50-meter) zone • Migratory bird nests • Known special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat • Within 1.75 miles of CIMPPs and historic properties eligible under the NRHP for which setting or feeling are important aspects of integrity • Fragile soils • Slopes greater than 15 percent • Public water supply intakes • Within 0.25 miles of residential, community, municipal, and public structures and buildings 	<p>Summary: ROW AVOIDANCE AREAS: Manage 5,900 acres of BLM-managed surface lands as ROW avoidance areas except in ROW corridors designated under this alternative (Figure 2-40, Appendix A):</p> <ul style="list-style-type: none"> • Hardwood trees, ponderosa pine, Douglas-fir, aspen trees • Eagle nests (varies by stage) • Raptor nest sites • Burrowing owl nesting habitat • Migratory bird nests • Known special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat • The Black Place • Public water supply intakes • Within 656 feet (200 meters) of residential, community, municipal, and public structures and buildings 	<p>Summary: ROW AVOIDANCE AREAS: Manage 5,900 acres of BLM-managed surface lands as ROW avoidance areas except in ROW corridors designated under this alternative (Figure 2-40, Appendix A):</p> <ul style="list-style-type: none"> • Hardwood trees, ponderosa pine, Douglas-fir, aspen trees • Eagle nests (varies by stage) • Migratory bird nests • The Black Place
186.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Manage as ROW avoidance areas within a 3-mile zone around designated Chacoan roads, including those in and outside of ACECs, and outliers.</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> • Subsurface pipelines are permitted 	<p>Allowable Use: Manage as ROW avoidance areas within a 5-mile zone around designated Chacoan roads, including those in and outside of ACECs, and outliers.</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> • Subsurface pipelines are permitted 	<p>Allowable Use: No similar action.</p>	

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		<ul style="list-style-type: none"> If there is no other feasible route around the avoidance areas, on a case-by-case basis, a ROW through the avoidance areas may be authorized 	<ul style="list-style-type: none"> If there is no other feasible route around the avoidance areas, on a case-by-case basis, a ROW through the avoidance areas may be authorized 		
187.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Manage as ROW avoidance areas within a 4-mile zone around CCNHP.</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> Subsurface pipelines are permitted If there is no other feasible route around the avoidance areas, on a case-by-case basis, a ROW through the avoidance areas may be authorized 	<p>Allowable Use: Manage as ROW avoidance areas within a 10-mile zone around CCNHP.</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> Subsurface pipelines are permitted If there is no other feasible route around the avoidance areas, on a case-by-case basis, a ROW through the avoidance areas may be authorized 	<p>Allowable Use: No similar action.</p>	
188.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: No similar action.</p>	<p>Allowable Use: Manage as ROW avoidance area for 1 mile on either side of the main entrance road to CCNHP (County Road 7950).</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> No construction, drilling, well completions, and/or workover rigs during peak visitation times, from April through October. Additional timing limitations on activities in this area could be identified through Section 106 consultation. 	<p>Allowable Use: No similar action.</p>	
189.	<p>Allowable Use: No hardwood tree with a diameter of 8 inches or more at the base or any ponderosa pine, Douglas-fir, or aspen tree is to be removed or damaged without approval of the BLM Authorized Officer.</p>				
190.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Manage as ROW avoidance in the active channel, 100-year floodplain, and 656-foot (200-meter) zone around the outside boundary of all 100-year floodplains and riparian systems, including the Ephemeral Wash Riparian Area.</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> Where feasible, cross only in designated corridors; group, collocate, and parallel approved linear authorizations to minimize disturbance, maximize undisturbed areas, and protect resources and resource uses Lessee may be required to place pipelines containing substances other than potable water under these areas, with a monitoring plan approved by the BLM Authorized Officer Avoid noninvasive tree removal Do not construct transmission structures in an active channel Avoid new low water crossings; if low- 	<p>Allowable Use: Manage as ROW avoidance in active channel, 100-year floodplain, and 150-foot zone around the outside boundary of all 100-year floodplains and riparian systems, including the Ephemeral Wash Riparian Area.</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> Where feasible, cross only in designated corridors; lessee may be required to place pipelines containing substances other than potable water under these areas, with a monitoring plan approved by the BLM Authorized Officer Avoid noninvasive tree removal Do not construct transmission structures in active channel Avoid new low-water crossings; if low-water crossing is necessary, place in designated corridors, where feasible 	<p>Allowable Use: No similar action.</p>	

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191.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>water crossing is necessary, place in designated corridors, where feasible</p> <p>Allowable Use: Manage as ROW avoidance within 656 feet (200 meters) of the delineated boundary or ordinary high water mark of known and newly discovered wetlands and natural seeps/springs, with mitigation measures determined on a site-by-site basis to protect water quality.</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> • Where feasible, cross only in designated corridors. Lessee may be required to place pipelines containing substances other than potable water under these areas, with a monitoring plan approved by the BLM Authorized Officer. Directional drilling may be prohibited or mitigation measures, stipulations, and/or COAs may be required to protect water quality beneath wetlands, depending on site-specific analysis. • Avoid noninvasive tree removal • Do not construct transmission structures in active channel • Avoid new low-water crossings; if low-water crossing is necessary, place in designated corridors, where feasible 	<p>Allowable Use: Manage as ROW avoidance within 150 feet of the delineated boundary or ordinary high water mark of known and newly discovered wetlands and natural seeps/springs, with mitigation measures determined on a site-by-site basis to protect water quality.</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> • Where feasible, cross only in designated corridors. Lessee may be required to place pipelines containing substances other than potable water under these areas, with a monitoring plan approved by the BLM Authorized Officer. • Avoid noninvasive tree removal • Do not construct transmission structures in active channel • Avoid new low-water crossings; if low-water crossing is necessary, place in designated corridors where feasible 	<p>Allowable Use: No similar action.</p>	
192.	<p>Allowable Use: Mountain Plover Nesting Habitat A preconstruction survey for mountain plover is required for proposed projects scheduled to be constructed within designated potential habitat during the nesting season of April 1 to August 1. Occupied mountain plover designated habitat would not be disturbed from April 1 to August 1.</p>	<p>Allowable Use: No similar action.</p>			
193.	<p>Allowable Use: For proposed projects within Clover's cactus and Aztec gilia habitat, a biological survey would be required. When individual plants or suitable habitat for these plants are found in designated potential habitat during a biological survey for a proposed project, every effort to relocate the proposed project would be explored to minimize disturbance.</p> <p>If proposed project activities do not begin within 1 year of a biological survey, a new survey may be needed, depending on the location of the project area. A new biological survey would be determined by the BLM Authorized Officer on a case-by-case basis.</p>	<p>Allowable Use: Special status plant species surveys are required to be completed before any surface-disturbing activities are approved in or next to special status plant species' potential, suitable, or occupied habitats. If proposed project activities do not begin within 1 year of a biological survey, a new survey may be needed, depending on the location of the project area. The need for a new biological survey would be determined by the BLM Authorized Officer on a case-by-case basis.</p> <p>Survey requirements are as follows:</p> <ul style="list-style-type: none"> • Surveys must be conducted by a qualified 	<p>Allowable Use: For proposed projects within or adjacent to suitable habitat for special status plants, a biological evaluation would be required to determine the level of surveys and survey area size that would be required. When suitable habitat for these plants are found during a biological survey for a proposed project, every effort to relocate the proposed project would be explored to minimize disturbance. If proposed project activities do not begin within one year of a biological survey, a new biological evaluation will be required to determine if new surveys are necessary.</p>	<p>Allowable Use: No similar action.</p>	

Line #	No Action Alternative <i>Current Management</i>	Alternative A <i>Support Natural Ecosystems</i>	Alternative B <i>Preserve and Protect Chacoan and Cultural Landscapes</i>	Alternative C <i>Balance Community Needs and Development</i>	Alternative D <i>Maximize Resources for Economic Outcomes</i>
		<p>botanist.</p> <ul style="list-style-type: none"> • The area to be surveyed would include at a minimum the project area, plus an additional 330 feet outside the project area. • Surveys would be conducted during the blooming season or the period in which the plant species is most easily detected, as determined by the BLM. <p>Based on the results of the survey, if special status plant species are identified within the project boundary and in the area of indirect/direct impacts or affected habitat, the following operational constraints would be required in occupied or suitable habitat:</p> <ul style="list-style-type: none"> • Avoidance/restriction of development, such as locating the surface disturbance area away from the edge of occupied or suitable habitat and ideally outside of the area where indirect/direct impacts would occur (the area of avoidance could be a minimum of 165 feet but possibly greater than 330 feet, as determined by the BLM); • Minimizing the area of disturbance, using such strategies as twinning, and using existing disturbance and corridors <p>Additional operational constraints may be required and could include any of the following:</p> <ul style="list-style-type: none"> • Dust abatement measures • Signs, fencing, and other deterrents to reduce possible human disturbance • Construction of well sites, roads and associated facilities (including projects within 330 feet of occupied habitat) outside of the blooming season • Specialized reclamation procedures such as <ul style="list-style-type: none"> ○ Separating soil and subsoil layers with barriers to reclaim in the correct order ○ Using a higher percentage of forbs in the reclamation seed mix to promote pollinator habitat ○ collecting seeds for sensitive plant species' genetic preservation, grow-out, and reclamation • Long-term monitoring of indirect/direct impacts on the species and/or habitat • Qualified, independent, third-party contractors to provide general oversight and ensure compliance with project terms 			

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
		and conditions during construction • Nonnative or invasive species monitoring and control in occupied and suitable habitat			
194.	Allowable Use: No construction activities shall be conducted between February 1 and June 30 within 0.33 miles of an active or historical golden eagle or bald eagle nest.	Allowable Use: No construction would be allowed from January 1 through June 30 within 0.5 miles of golden and bald eagle nest sites. Additional requirements may apply, depending on project type and impacts on nesting eagles. Surface-disturbing activities occurring outside of the breeding season (seasonal restriction zone), but within the spatial restriction zone, would be allowed, as long as the activities would not cause the nest site to become unsuitable for future nesting, as determined by the BLM Authorized Officer. Facilities and other permanent structures would be allowed if they meet the above criteria. This management would not apply to any nest of any territory that has been determined to be inactive, generally after 5 years of nonbreeding activity, as determined by the BLM Authorized Officer.	Allowable Use: No construction activities would be allowed from January 1 to June 30 within 0.5 miles of bald and golden eagle nest sites. Surface-disturbing activities occurring outside of the breeding season (seasonal restriction zone), but within the spatial restriction zone, would be allowed, as long as they would not cause the nest site to become unsuitable for future nesting, as determined by the BLM Authorized Officer. Facilities and other permanent structures would be allowed if they meet the above criteria. Courtship/nest building and egg laying/incubation stage: No construction would be allowed within 0.5 miles of an active or historical nest from January 1 to March 30. Since ROW actions generally tend to be less intrusive and short in duration, the 0.5-mile restriction zone would be enforced on a case-by-case basis, depending on the type of project, duration, timing, and level of impact, if any. Nestling/rearing stage: No construction activities would be allowed within 0.33 miles of an active or historical nest from April 1 to June 30. Since the timing of these stages varies each year, due to such conditions as abiotic factors (weather and temperatures), food availability, age and reproductive history of mating pair, and other intrinsic factors, timing dates may vary. Timing restriction dates provided are based on proposed projects considered to be the most intrusive, such as oil and gas drilling. Exceptions to these timing restrictions would be considered, based on type of project, duration, and impacts (if any) on the nesting eagles. Stricter restrictions may apply for any proposed project that may have negative impacts on the successful nesting of eagles.		
195.	Allowable Use: No construction activities shall be conducted between March 1 and June 30 within 0.33 miles of an active or historical prairie falcon, peregrine falcon, or ferruginous hawk nest.	Allowable Use: Construction is not allowed during seasonal raptor nesting periods. Raptor nesting sites, both active and historical, will be avoided by the distances and seasonal periods listed below. This stipulation does not apply to facility operation and maintenance, except when operation and maintenance is determined to have a negative impact on the nesting behavior of the raptors. <ul style="list-style-type: none"> • Ferruginous hawk—0.33 miles (March 1 to June 30) • Prairie falcon—0.33 miles (March 1 to June 30) • Peregrine falcon—0.33 miles (March 1 to June 30) • Osprey—0.25 miles (during the nesting/rearing stage: April 1 to August 31) Noise from equipment that operates more than 8 hours/day for more than 1 week would be kept at or below 48.6 dBA at specified locations to minimize disturbances to ferruginous hawk and prairie falcon nests.	Allowable Use: Noise from equipment that operates more than 8 hours/day for more than 1 week would be kept at or below 48.6 dBA at specified locations to minimize disturbances to ferruginous hawk and prairie falcon nests.		Allowable Use: No similar action. Compliance with the Migratory Bird Treaty Act is required.
196.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: A survey for burrowing owls is required for proposed project activity in designated potential nesting habitat from April 1 to August 15. Occupied burrowing owl nests would not be disturbed within a 165-foot (50-meter) radius from April 1 to August 15. After August 15, any project that would cause destruction of the nest burrow could begin only after confirmation by the BLM that the nest burrow is no longer occupied.			Allowable Use: No similar action.
197.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Construction would not be allowed within 3,168 feet (0.6 miles) of active pinyon jay colonial nest sites from March 1 to August 1. Noise levels would not exceed 48.6 dBA at the edge of the active nesting colony during this time period. Surveys for pinyon jays will be conducted prior to construction. Any future recommended conservation measures developed for the pinyon jay by the USFWS will be incorporated into the RMP.	Allowable Use: No similar action.		
198.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: No ground-disturbing activities within 165 feet (50 meters) of an active Gunnison's prairie dog colony boundary. Ground-disturbing activity may be permitted using BMPs, if a Gunnison's prairie dog colony overlaps a ROW or other infrastructure and if other alternatives have been determined not to be reasonable through the NEPA process.	Allowable Use: No similar action.		

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
199.	<p>Allowable Use: No construction activities from May 15 to August 1 without a migratory bird nest survey, if proposed disturbance exceeds 4.0 acres. These surveys would be conducted by a BLM FFO-authorized officer, using a survey protocol by the BLM Authorized Officer. If any active nests are located within the proposed project area, project activities would not be permitted without written approval by the BLM Authorized Officer. Exceptions may be granted by the BLM Authorized Officer if determined that the proposed actions would not significantly impact migratory birds and their habitat or if the NEPA document adequately discloses impacts on nesting birds.</p>	<p>Allowable Use: For proposed projects of 4.0 acres or more of surface disturbance, no construction from May 15 to July 31 would be permitted without a migratory bird nest survey. These surveys would be conducted by a BLM FFO-authorized biologist using a survey protocol provided by a BLM Authorized Officer. If any active nests are in the proposed project area, construction would not be allowed until written consent is received from the BLM Authorized Officer. If construction is allowed when the nest identified in the survey is still active, monitoring may be required, and construction may be stopped if it is determined to be disrupting the nest.</p>			<p>Allowable Use: Same as the No Action Alternative.</p>
200.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Manage as ROW avoidance within known special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat.</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> • Parcels containing known special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat shall undergo a site-specific survey by a BLM-approved specialist/biologist to identify necessary special design, construction, implementation, and/or mitigations measures. Based on the results of the survey, if special status bat species are identified within the project boundary and in the area of indirect/direct impacts or affected habitat, the following operational constraints would be required in known special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat: <ul style="list-style-type: none"> ○ Avoidance/restriction of development, such as locating the surface disturbance area away from the edge of special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat and ideally outside the area where indirect/direct impacts would occur (the area of avoidance could be greater than 656 feet (200 meters), as determined by the BLM). ○ Minimize the area of disturbance, utilizing such strategies as, but not limited to, twinning, and utilizing existing disturbance and corridors. ○ If avoidance of known special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat is unattainable under standard lease terms and conditions, the operator/lessee may be required to submit a special status bat species protection plan to the BLM Authorized Officer. The plan may require, but is not limited to, special design, construction, and implementation measures describing how adverse impacts on known special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat would be prevented or minimized. 			<p>Allowable Use: No similar action.</p>
201.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Manage the Black Place as an ROW avoidance area.</p>	<p>Allowable Use: No similar action. See ROW exclusion section.</p>	<p>Allowable Use: Same as Alternative A.</p>	
202.	<p>Allowable Use: No similar action in the 2003 RMP.</p>	<p>Allowable Use: Manage as ROW avoidance within 3,696 feet (0.7 miles) of CIMPPs and historic properties eligible for listing on the NRHP for which setting or feeling are important aspects of integrity.</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> • Facilities may be placed in this area so long as they do not emit or result in noise or create permanent visual impacts. Pipelines are an example of facilities meeting these criteria. • Facilities emitting or resulting in noise or creating permanent visual impacts may be allowed if sufficient noise and/or visual 	<p>Allowable Use: Manage as ROW avoidance within 1.75 miles of CIMPPs and historic properties eligible for listing on the NRHP for which setting or feeling are important aspects of integrity.</p> <p>Avoidance criteria:</p> <ul style="list-style-type: none"> • Facilities may be placed in this area so long as they do not emit or result in noise or create permanent visual impacts. Pipelines are an example of facilities meeting these criteria. • Facilities emitting or resulting in noise or creating permanent visual impacts may be allowed if sufficient noise and/or visual 	<p>Allowable Use: No similar action.</p>	

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
		mitigation measures are implemented, as directed by the BLM Authorized Officer.	mitigation measures are implemented, as directed by the BLM Authorized Officer.		
203.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Manage fragile soils as ROW avoidance areas.		Allowable Use: No similar action.	
204.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Manage slopes greater than 15 percent as ROW avoidance areas.		Allowable Use: No similar action.	
205.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Manage public water supply intakes as ROW avoidance areas.			Allowable Use: No similar action.
206.	Allowable Use: No similar action in the 2003 RMP.	Allowable Use: Manage as ROW avoidance areas within 1,320 feet (0.25 miles) of any house, barn, occupied dwelling, structure on a home site lease, or building unit, including those structures occupied intermittently or seasonally, or other community, municipal, and public structures and buildings, such as chapter houses and schools, and other sensitive receptors, as defined by the EPA.		Allowable Use: No similar action.	Allowable Use: No similar action.
207.	LANDS AND REALTY—UTILITY CORRIDORS (LAND USE AUTHORIZATIONS)				
208.	Utility corridor definitions: <ul style="list-style-type: none"> • West-wide energy corridor designated in response to Section 368 of the Energy Policy Act of 2005. • Definition 2—Grouping, collocating, and paralleling linear authorizations to minimize disturbance, maximize undisturbed areas, and protect resources and resource uses. These may be mentioned throughout the matrix as corridors. Other definitions mentioned and their distinction: <ul style="list-style-type: none"> • Approved corridor—When crossing a protected feature, like Great North Road, a riparian area, wetland, or habitat, this refers to a grouping of linear authorizations that have been approved by the lead specialist for the resource as a reasonable location to have linear authorizations cross the feature. • Proposed corridors—When crossing a protected feature like Great North Road, riparian area, wetland, or habitat, this refers to a grouping of linear authorizations that have been identified and proposed by the lead specialist for the resource as a reasonable location to have linear authorizations cross the feature, but they have not been approved. 				
209.	Action: Manage the designated West-wide Energy Corridor (80-273) according to existing policy (Appendix B of the West-wide Energy Corridor Programmatic EIS; BLM 2009; Figure 2-41, Appendix A) ROW exclusion and avoidance areas do not apply in designated utility corridors.	Action: Same as the No Action Alternative, plus designate and manage the following additional definition 2 corridors (2,500 feet wide) for public utilities and facilities (Figure 2-42, Appendix A): <ul style="list-style-type: none"> • Highway 550 south of Turtle Mountain • The Public Service Company of New Mexico’s YJ transmission, from the San Juan Generating Station to Albuquerque • The Public Service Company of New Mexico’s FJ transmission line • Public Service Company of New Mexico’s Rio Puerco line (WW) • Public Service Company of New Mexico’s APS Plant to West Mesa switch line (FW) • Transwestern 42-inch pipeline • Hillcorp 30-inch pipeline • Kinder Morgan 30-inch pipeline • Kinder Morgan CO₂ pipeline • New Mexico Gas Company Albuquerque pipeline • Chaco Plant line, north of the Chaco Plant • Arkansas loop, from Bloomfield to Ignacio • Department of Energy power lines • Western Area Power Administration power 	Action: Same as Alternative A, plus <ul style="list-style-type: none"> • Identify and designate additional definition 2 corridors (500 feet wide) that follow existing pipeline ROWs that are 16 inches or greater in diameter (Figure 2-43, Appendix A). ROW exclusion and avoidance areas do not apply in designated utility corridors.		

Line #	No Action Alternative Current Management	Alternative A Support Natural Ecosystems	Alternative B Preserve and Protect Chacoan and Cultural Landscapes	Alternative C Balance Community Needs and Development	Alternative D Maximize Resources for Economic Outcomes
		lines • City of Farmington high voltage lines ROW exclusion and avoidance areas do not apply in designated utility corridors. For future corridor designation, consider neighboring field offices and their corridors. Try to edge match, if possible.			
210.	Action: LUA-MA-1. Activities that would generally be excluded from ROW corridors include salable mineral sales, range and wildlife habitat improvements involving surface disturbance and facility construction, campgrounds and public recreational facilities, and other facilities that would attract public use (ROD, 6).	Allowable Use: Avoid ROW corridors within 3 miles of a Chacoan great house and ROW corridors that parallel or cross the Great North Road or other Chacoan roads designated by the BLM Authorized Officer (including those in and outside of ACECs).	Allowable Use: Avoid ROW corridors within 5 miles of a Chacoan great house and ROW corridors that parallel or cross the Great North Road or other Chacoan roads designated by the BLM Authorized Officer (including those in and outside of ACECs).	Allowable Use: Same as Alternative A.	Allowable Use: Avoid ROW corridors within 1 mile of a great house, ROW corridors parallel to or crossing the Chaco Great North Road, or ROW corridors that cross or parallel other designated Chacoan roads (including those in and outside of ACECs).
211.	LANDS AND REALTY—LAND TENURE ADJUSTMENTS (EXCHANGE)				
212.	Action: No similar action in the 2003 RMP.	Action: To comply with Public Law 96-550, the BLM would consider unleased lands for exchange with the NPS within 1 mile of the CCNHP (approximately 1,200 acres), plus an additional 2,200 acres to the northeast of the CCNHP, for a total of 3,400 acres, in order to meet the minimum 3:1 acre ratio requirement in section 504(d)(1) of that Law (Figure 2-44, Appendix A).			

Table 2-3
Description of BIA No Action Alternative and Alternatives A, B, C, and D

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
1.	<i>Fluid Minerals—General Surface Disturbance</i>				
2.	<p>Action: No similar stipulation in current BIA management.</p>	<p>Action: To minimize surface disturbance, roads, utilities and pipelines may share common ROWs.</p> <ul style="list-style-type: none"> • Interim reclamation would be required to reestablish local native vegetation in area of disturbance. • As part of interim reclamation, the footprint of disturbance would be minimized by reclaiming all portions of the cleared areas not needed for production, operations, transportation, or safety purposes by recontouring them with stockpiled topsoil to a final or intermediate contour that blends with the surrounding topography as much as possible. 	<p>Action: Directional drilling may be required, where practical, to collocate wells to reduce road, well pad, and utility surface disturbance. To minimize surface disturbance, roads, utilities and pipelines may share common ROWs.</p> <ul style="list-style-type: none"> • Access roads would be designed to follow the contour of the landform and/or mimic lines in vegetation. This can necessitate constructing longer access roads. • Interim reclamation would be required to reestablish local native vegetation on well locations. As part of interim reclamation, the footprint of disturbance would be minimized by reclaiming all portions of the cleared areas not needed for production, operations, transportation, or safety purposes by recontouring them with stockpiled topsoil to a final or intermediate contour that blends with the surrounding topography as much as possible. 		<p>Action: To minimize surface disturbance, roads, utilities and pipelines may share common ROWs. Site infrastructure to accommodate the needs of the landowner.</p> <p>Interim reclamation would be required to reestablish local native vegetation on well locations. As part of interim reclamation, the footprint of disturbance would be minimized by reclaiming all portions of the cleared areas not needed for production, operations, transportation, or safety purposes by recontouring them with stockpiled topsoil to a final or intermediate contour that blends with the surrounding topography as much as possible.</p>
3.	<p>Action: Lessees would abide by and conform to appropriate provisions of Title 25, 36, and 43 CFRs and any other applicable regulations and manuals of the Secretary of the Interior now or hereafter in force, relative to the surface leasing, ROWs, and oil and gas leases (including NEPA, as amended, and Navajo Area Environmental Protection guidelines; the NHPA of 1966, as amended, and Archaeological Resources Protection Act, hereafter referred to as NEPA, NHPA, and ARPA), and other applicable laws, 36 CFR 800, and 43 CFR 7.</p> <p>2(a): Prior to issuing any cultural clearances, the BLM would consult with the Navajo Nation Historic Preservation Department (P.O. Box 2898, Window Rock, Arizona 86515) and provide copies of all historic preservation and related documents associated with an undertaking. The Navajo Nation contracted with the Navajo Area Archaeology Office under Public Law 93-638.</p> <p>2(b): Prior to entry on the land or the disturbance of the surface thereof for drilling or other purposes, a lessee would submit a development plan for the surface use to the Area Manager, Farmington Resource Area, Bureau of Land Management (625 I College Blvd., Suite A, Farmington, New Mexico 87402). An environmental analysis would be made by the BLM, in consultation with the BIA Navajo Regional Office, for the purpose of ensuring proper protection of the surface, the natural resources, and the environmental and existing improvements and for assuming timely reclamation of disturbed lands. Upon completion of said environmental analysis, the oil and gas district manager would notify the lessee of the conditions to which the proposed surface-disturbing operations would be subject. (Note: Prior to start of operations, lessees would furnish a copy of their development plans and BLM conditions to the BIA. The BIA reserves the right to require site-specific archaeological surveys and environmental reviews on tracts</p>	<p>Action: A lessee would abide by and conform to appropriate provisions of Title 25, 36, and 43 CFRs and any other applicable regulations and manuals of the Secretary of the Interior now or hereafter in force, relative to the surface leasing and use, ROWs, and oil and gas leases (including NEPA, NHPA, ESA, ARPA, and other applicable laws).</p> <p>The lessee would comply with all applicable laws of the Navajo Nation or requirements of the Navajo Nation Environmental Protection Agency. This compliance with relevant, applicable, federal and Tribal regulations would also apply to operators on split-estate with Tribal trust surface use agreements and federal fluid minerals.</p>			

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	selected for development, prior to giving concurrence to proposed actions. The BIA would consult with the Navajo Nation prior to concurring on actions.				
4.	Action: Lessees would bury all pipelines crossing tillable lands at a minimum of 4 feet or below plow depth, unless other arrangements are made with the Navajo Nation.				
5.	Action: The lessee agrees to conduct all operations authorized by this lease with due regard for proper land management; to avoid unnecessary damage to vegetation, timber, crops or other cover and to improvements, such as roads, bridges, cattle guards, and telephone lines; to control soil erosion resulting from the operation to prevent pollution of soil and water resources; and, whenever required by the BIA Navajo Agency Superintendent or authorized representative, to fence all sump holes or other excavation made by the lessee.	Action: The lessee agrees to conduct all operations authorized by this lease with due regard for proper land management; to avoid unnecessary damage to wildlife and vegetation, timber, crops, or other cover, and to improvements, such as roads, bridges, cattle guards, and telephone lines; to control soil erosion resulting from the operation to prevent pollution of soil and water resources; and, whenever required by the FIMO Director or authorized representative, to fence all sump holes or other excavations made by the lessee.	Action: The lessee agrees to conduct all operations authorized by this lease with due regard for proper land management; to avoid unnecessary damage to cultural resources, burial sites, vegetation, timber, crops, or other cover, and to improvements, such as roads, bridges, cattle guards, and telephone lines; to control soil erosion resulting from the operation to prevent pollution of soil and water resources; and, whenever required by the FIMO Director or authorized representative, to fence all sump holes or other excavation made by the lessee.	Action: The lessee agrees to conduct all operations authorized by this lease with due regard for proper land management to avoid unnecessary damage to human health and safety, CIMPPs and Indian trust assets, vegetation, timber, crops or other cover, and to improvements, such as roads, bridges, cattle guards, and telephone lines; to control soil erosion resulting from the operation to prevent pollution of soil and water resources; and, whenever required by the FIMO Director or authorized representative, to fence all sump holes or other excavation made by the lessee.	Action: The lessee agrees to conduct all operations authorized by this lease with due regard for proper land management; to avoid unnecessary damage to vegetation species, timber, crops, or other cover, and to improvements, such as roads, bridges, cattle guards, and telephone lines; to control soil erosion resulting from the operation to prevent pollution of soil and water resources; and, whenever required by the FIMO Director or authorized representative, to fence all sump holes or other excavation made by the lessee.
6.	Action: Compliance with the stipulations of NEPA (applies to individual Indian allotment lands only): Prior to entry upon the leased land or the disturbance of the surface, the lessee shall submit NEPA compliance documentation to FIMO, Navajo Regional Office, P.O. Box 1060, Gallup, New Mexico 87305. An analysis will be made of the plan by the BIA and the FIMO for the purpose of insuring that the surface, natural resources, the environment and existing improvements are properly protected and timely reclamation of disturbed areas. Upon completion of the analysis, the BIA shall notify the lessee of the stipulations and the conditions that the proposed surface disturbance operations will be subject [to]. Notwithstanding any provisions of this lease to the contrary, any drilling, construction, or other operations conducted by the lessees that would disturb the surface or otherwise affect the environment (hereinafter called surface-disturbing operation) would be subject to, as set forth in this stipulation, the prior approval of the BLM, with consultation with the appropriate surface management agency (e.g., FIMO) and such reasonable conditions as may be required to protect the surface of the leased lands and the environment.	Action: (Applies to individual Indian allotment lands only.) The lessee would comply with NEPA and all other applicable laws and regulations. Before leasing and/or surface-disturbing activities begin, the FIMO would complete NEPA compliance documentation for the entire leased area. On completion of the analysis, the FIMO Director would notify the lessee of the stipulations and the conditions that the proposed surface-disturbing operations would be subject to, based on NEPA required mitigation.			
7.	Action: Forest and land protection stipulation: <ul style="list-style-type: none"> • The lessee would submit in advance to the Secretary for approval, a site development and layout plan, construction plan, and any revisions • Not to cut, destroy, or damage timber without prior authorization of the Secretary of the Interior, such authorization to be made only where required to pursue necessary mining operations • Pay for all such timber cut, destroyed, or damaged at rates 	Action: The lessee would refrain from destroying or damaging woodlands and/or vegetation. The lessee would pay for all such destroyed or damaged vegetation at rates prescribed by the BIA Navajo Regional Director, based on fair market value.			Action: The lessee (or operator with a SUA) would minimize destruction or damage to woodlands. The lessee would pay for all such destroyed or damaged woodlands at rates prescribed by the BIA Navajo Regional Director, based on fair market value.

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
	<p>prescribed by the Area Director (Regional Director), such rates to be determined on the basis of sales of similar timber in the vicinity</p> <ul style="list-style-type: none"> • Not to interfere with the sale or removal of timber from the land covered by this lease by contractors operating under an approved timber sales contract now in effect or that may be entered into during the period of the lease 				
8.	<p>Action: If so required by the Regional Director or authorized representative, the lessee would condition, under the direction of BLM, any well drilled that does not produce oil or gas in paying quantities, as determined by the BLM but which is capable of producing water for domestic, agricultural, or livestock use by the lessor. The lessee may remove all pumping equipment installed by the lessee at any well within 90 days after expiration or termination of the lease; otherwise such equipment would become the property of the lessor, except where such well is left for use by the lessor or other surface owners, in which case all water pumping equipment and storage tanks would be left on the premises and become the property of the lessor.</p>	<p>Action: The lessee, with the consent of the lessor, would condition any well drilled that does not produce oil or gas in paying quantities and is capable of producing water of applicable standards for domestic, agricultural, or livestock use by the lessor. Otherwise, after expiration or termination, the facilities installed by lessee within the lease premises would be removed and the surface properly reclaimed by the lessee.</p>			
9.	<i>Fluid Minerals—ROWS</i>				
10.	<p>Action: Vehicular access to the well site would be limited to the approved access road. Additional unapproved access to the well site materializing during the existence of the well would be processed as trespass.</p>	<p>Action: To limit impacts on resources, all lessee vehicular access to the well site (on lease or off lease) would be limited to the approved access road. Additional unapproved access by the lessee to the well site materializing during the existence of the well would be cited as a violation of the lease.</p>			
11.	<p>Action: Erosion in the access road would be corrected. Preventive measures would be at the operator's discretion. A permanent side road of the erosion would be prohibited.</p>	<p>Action: Operators would ensure that dirt roads are maintained in accordance with Clean Water Act 404, 401, and 402 standards and in accordance with BLM standards regarding road maintenance and erosion.</p>		<p>Action: For leases on Navajo Tribal trust lands, operators would ensure that dirt roads are maintained in accordance with Clean Water Act 404, 401, and 402 standards and in accordance with BLM standards regarding road maintenance and erosion. For leases on individual Indian allotments, measures to prevent erosion for roads that would not be reclaimed following well abandonment would be established through coordination with the landowner.</p>	
12.	<i>Fluid Minerals—Cultural Resources</i>				
13.	<p>Action: No similar stipulation in current BIA management.</p>	<p>Action: No similar action.</p>	<p>Action: Directional drilling may be required to hide proposed well locations from culturally sensitive viewpoints. These viewpoints may not be on the proposed lease and would be defined through consultation with the BIA, Navajo Nation, other Tribes with TCPs in the viewshed, and local communities.</p>	<p>Action: No similar action.</p>	

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
14.	<p>Action: The lessee would not drill any well within 500 feet of any house, structure, water reservoir, live stream, or other body of water without the written consent of the Navajo Nation Minerals Department and the Water Code Administration.</p> <p>(Applies to individual Indian allotment lands only.) The lessee would not construct any well pad within 200 feet of any structures or improvements.</p>	<p>Action: The lessee would not construct any well pad within 1,320 feet (0.25 miles) of any house, barn, occupied dwelling, structure on a home site lease, or building unit (including those structures occupied intermittently or seasonally), or other community, municipal, and public structures and buildings, such as chapter houses and schools.</p>		<p>Action: (Applies to Navajo Tribal trust lands only.) The lessee would not construct any well pad within 500 feet of any house, barn, occupied dwelling, structure on a home site lease, or building unit (including those structures occupied intermittently or seasonally), or other community, municipal, and public structures and buildings, such as chapter houses and schools.</p> <p>(Applies to individual Indian allotment lands only.) The lessee would not construct any well pad within 200 feet of any structures or improvements—or at a distance approved by the allottee—without the surface owner’s written consent.</p>	
15.	<p>Action: The BIA would ensure the following stipulations are completed before any development:</p> <ol style="list-style-type: none"> 1. Exploration phase—An area of potential effect (APE) of no less than 100 feet in width would be inventoried on any proposed lines, underdeveloped roads, or trails that provide access to these lines. Archaeological inventories would be conducted on a 10-acre area of potential effect (APE) around test wells, as well as a 100-foot corridor along any underdeveloped access roads, such as two-tracks to the test wells. The Navajo Nation THPO would be consulted to determine the appropriate avoidance/mitigation strategy for any historic properties in these corridors. 2. Production phase—If exploration leads to further development, the BIA would consult with the Navajo THPO to determine the appropriate level of inventory, which would depend on the density of wells and associated infrastructure. At a minimum, the APE of the new gas/oil wells would require archaeological inventories on a 10-acre area around each well and a 100-foot corridor for any pipelines and access roads. If full field development is proposed, then a block survey for the entire 160-acre APE may be required. The Navajo THPO would be consulted to determine the appropriate avoidance/mitigation strategy for any historic properties in the APE. 	<p>Action: The lessee would comply with the Navajo Nation’s Cultural Resources Protection Act (NNCRPA), as well as the Jishchaa’ Policy. A site-specific survey of the APE would be conducted before ground-disturbing activities identified under the APD. For leases on individual Indian allotments, the BIA would consult with landowners to determine final disposition of cultural resources and human remains. The Navajo Nation THPO would be requested to recommend the appropriate avoidance or other mitigation strategy for any historic properties, TCPs, or burials in the APE, as well as any other cultural resources that Navajo Nation THPO specifically identifies, with final determination from the Regional Director of the BIA. Per Section 106 of the NHPA and other relevant regulations, the Navajo Nation THPO would consult with Tribes, local communities and Navajo chapters regarding cultural resources.</p>			
16.	<p>Action: Lands held in trust by the Secretary of the Interior for an Indian Tribe or any individual member thereof or held in restricted fee status would continue to be so managed or held by the Secretary (16 USC 1, Subsection Lix-G: Chaco Culture National Historical Park §410ii–5).</p>	<p>Action: Lands held in trust by the Secretary of the Interior for an Indian Tribe or any individual member thereof or held in restricted fee status would continue to be so managed or held by the Secretary. Management of CCNHP under the general management plan (as amended in 2012) is limited to NPS-administered lands and would not abridge the BIA’s trust responsibilities to manage individual Indian allotments within the boundaries of CCNHP.</p>			

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
17.	<i>Fluid Minerals—Public Health and Safety</i>				
18.	<p>Action: The lessee would not use or permit to be used any part of said leased land for unlawful conduct or purposes whatsoever. The lessee would not use or permit to be used any of said leased land for the manufacture, sale, gift, transportation, or storage of intoxicating liquors, beverages, or drugs. In the event any representative of the lessee or its contactor or subcontractor, employed in connection with the operations on the lease premises, were responsible for any of the unlawful acts described in this clause, the BLM would give lessee information as to such violations, with a copy of the notice to the BIA and the Navajo Nation. The lessee would immediately take steps to cure the violation, including terminating or transferring such employee (25 CFR 162.604; 18 USC 1151, 1154, and 1156, as amended).</p>	<p>Action: The lessee would not use or permit to be used any part of said leased land for unlawful conduct or purposes whatsoever. The lessee would not use or permit to be used any of said leased land for illegal activities, such as the manufacture, sale, gift, transportation, or storage of intoxicating liquors, beverages, or drugs. In the event any representative of the lessee or its contactor or subcontractor, employed in connection with the operations on the lease premises, were responsible for any of the unlawful acts described in this clause or in the 2017 Legislation No. 0117-17—Navajo Nation Law Against Human Trafficking—that amended the Navajo Nation Criminal Code Title 17, then the BIA or BLM would give lessee information as to such violations, with a copy of the notice to the BIA or BLM, as appropriate, and the Navajo Nation and Federal Law Enforcement, as appropriate. The lessee would immediately take steps to cure the violation, including terminating or transferring such employee (25 CFR 162.604; 18 USC 1151, 1154, and 1156, as amended). The lease may be subject to cancellation.</p>			
19.	<i>Fluid Minerals—Water Resources</i>				
20.	<p>Action: On the request of the Navajo Nation Water Code Administration (NNWCA), or if so required by the Navajo Regional Director or authorized representative, and under the direction of the BLM Field Manager, the lessee would condition any well drilled that does not produce oil or gas in paying quantities and is capable of producing water satisfactorily for domestic, agricultural, or livestock use by the landowner. Otherwise, after the expiration or termination of the lease, the lessee would remove all pumping equipment installed by lessee at any well and plug the well.</p>				
21.	<p>Action: (Applies to individual Indian allotment lands only.) The lessor expressly reserves the right to use sufficient gas free of charge for all stoves and inside lights in the principle dwelling house on said lands by making connection at the lessor’s own expense with the well or wells thereon, the use of such gas to be at the lessor’s risk at all times.</p>	<p>Action: (Applies to individual Indian allotment lands only.) For reasons of public health and safety, any new leases granted on individual Indian allotments would no longer include the previous lease stipulation, wherein “the lessor expressly reserves the right to use sufficient gas free of charge for all stoves and inside lights in the principle dwelling house on said lands by making connection at his own expense with the well or wells thereon, the use of such gas to be at the lessor’s risk at all times.”</p>			
22.	<p>Action: Navajo grazing rights would be protected, and the Navajo Nation’s rights respecting the use of water would be unimpaired.</p>	<p>Action: The Navajo Nation’s rights respecting the use of water would be unimpaired. The lessee would not use any waters of the Navajo Nation, such as wells, tanks, rivers, springs, washes, creeks, and stock water reservoirs, without a water use permit issued by the NNWCA. The lessee would not drill any water wells for its use without a drilling permit from the Water Code Administration.</p>			
23.	<i>Fluid Minerals—Livestock and Grazing</i>				
24.	<p>Action: Navajo grazing rights would be protected, and the Navajo Nation’s rights respecting the use of water would be unimpaired.</p>	<p>Action: Navajo grazing privileges would be protected. The lessee would negotiate and compensate the landowner for all surface use, including grazing lands.</p>			
25.	<p>Action: No similar stipulation in current BIA management.</p>	<p>Action: Any range improvement, such as fences, pipelines, and ponds, disturbed by construction would be restored immediately following construction to the condition they were in before disturbance, or better.</p>			
26.	<i>Fluid Minerals—Socioeconomics</i>				
27.	<p>Action: As to the field operations carried out on the leased premises, the lessee would make reasonable efforts to employ Navajo labor in all positions for which they are qualified. In the event of a conflict between the terms of the lease and those contained with this Exhibit A, the terms contained in this Exhibit A would control.</p>	<p>Action: All hiring practices would comply with Navajo or Indian preference laws in effect. The lessee would make reasonable efforts to employ Navajo or Indian labor in all positions for which they are qualified.</p>			

Line #	No Action Alternative Current Management	Alternative A Protect and Enhance Natural Ecology	Alternative B Preserve and Protect Chacoan and Natural Landscape	Alternative C Traditional, Historic, Socioeconomic, and Cultural Lifeways	Alternative D Maximize Resource Production in an Environmentally Responsible Manner
28.	<i>Fluid Minerals—Yádiłhił and Light Pollution</i>				
29.	<p>Action: No similar stipulation in current BIA management.</p>	<p>Action: Develop and implement measures to control lighting and light resulting from flaring on well sites and off-site facilities to limit light pollution. The lighting measures should consider sensitive wildlife habitat or nest locations and could include the following:</p> <ul style="list-style-type: none"> • Down lighting • Flare shielding • Alternate lighting colors 	<p>Action: Develop and implement measures to control lighting and light resulting from flaring on well sites and off-site facilities to limit light pollution. The lighting measures should emphasize limiting light pollution at views seen from key cultural resources identified by the NPS, Navajo Nation, or other Tribes. The lighting measures should include the following:</p> <ul style="list-style-type: none"> • Down lighting • Flare shielding • Alternate lighting colors 	<p>Action: Develop and implement measures to control lighting and light resulting from flaring on well sites and off-site facilities, to protect <i>Yádiłhił</i> and limit light pollution. The lighting measures should be considerate of locations significant to local residents, such as any house, barn, occupied dwelling, structure on a home site lease, or building unit (including those structures occupied intermittently or seasonally), or other community, municipal, and public structures and buildings, such as chapter houses and schools. The lighting measures should include the following:</p> <ul style="list-style-type: none"> • Down lighting • Flare shielding • Alternate lighting colors • Timing restrictions <p>Operators are required to notify the community one week in advance of flaring and to provide flaring information.</p>	<p>Action: Develop and implement measures to control lighting and light resulting from flaring on well sites and off-site facilities, to limit light pollution. Operators are required to notify the community one week in advance of flaring and to provide flaring information.</p>
30.	<i>Fluid Minerals—Noise</i>				
31.	<p>Action: No similar stipulation in current BIA management.</p>	<p>Action: Noise levels at nest sites for golden eagles and ferruginous hawks would be no higher than 48.6 dBA.</p>	<p>Action: Noise levels at the boundary of CCNHP and Chacoan outlier sites would be no higher than 35 dBA at night.</p>	<p>Action: Noise levels at locations significant to residents, such as any house, barn, occupied dwelling, structure on a home site lease, or building unit (including those structures occupied intermittently or seasonally), or other community, municipal, and public structures and buildings, such as chapter houses and schools, and CIMPPs, would be no higher than 35 dBA at night.</p>	<p>Action: Same as the No Action Alternative.</p>

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Chapter 3. Affected Environment and Environmental Consequences

3.1 INTRODUCTION

The following sections describe current conditions and alternative-based impacts for each resource topic. Additional supporting documentation is provided in two Supplemental Reports: Farmington Mancos-Gallup 2019 Affected Environment Supplemental Report (Affected Environment Supplemental Report) and Farmington Mancos-Gallup 2019 Environmental Consequences Supplemental Report (Environmental Consequences Supplemental Report). The purpose of the affected environment sections is to describe the existing biological, physical, and socioeconomic characteristics of the planning area. The environmental consequences sections are analyses of the potential direct, indirect, and cumulative impacts, including human uses, that could result from implementing the alternatives described in **Chapter 2**. The analysis methodology and nature of impacts for individual resources are described in the Environmental Consequences Supplemental Report.

Unavoidable adverse impacts from management actions are presented in **Section 3.8**. Irreversible and irretrievable commitment of resources is discussed in **Section 3.9**. See **Section 3.10**, Relationship Between Local Short-Term Uses and Long-Term Productivity, for a discussion of the relationship between local, short-term uses of the human environment and the maintenance and enhancement of long-term productivity of resources.

Figures not included directly in the text are provided in **Appendix A**, Figures. Acreage figures and other numbers are approximated using geographic information system (GIS) technology and do not reflect exact measurements.

Topic areas were identified for inclusion in this chapter based on their presence or absence in the planning area and whether they were identified as issues of concern in internal and external scoping. For example, certain types of resources that may be present in other planning areas do not exist in the FMG planning area; therefore, they are not covered in this chapter.

The direct and indirect impact analysis is broken down by agency (BLM and BIA) in each resource section, due to their differing sets of alternatives. For each agency, any impacts that are common to all of the agency alternatives are discussed first, followed by impacts that differ by alternative. The cumulative analysis provided in the individual resource sections considers cumulative impacts based on the BLM and BIA combined actions, in addition to other actions in the planning area.

The BLM will engage in monitoring after the signing of the ROD for this RMPA to assess land health and to guide implementation management decisions. Monitoring objectives will include monitoring indicators, the condition determination method, the condition benchmarks, a time objective for achieving the desired results, and the proportion required to meet the benchmark.

A protocol to estimate what is referenced as the “social cost of carbon” (SCC) associated with GHG emissions was developed by a federal Interagency Working Group (IWG). This protocol was developed to assist agencies in addressing Executive Order (EO) 12866, which requires federal agencies to assess the cost and the benefits of proposed regulations as part of their regulatory impact analyses. The SCC is an estimate of the economic damages associated with an increase in carbon dioxide emissions and is intended to be used as part of a cost-benefit analysis for proposed rules. As explained in the Executive Summary of the 2010 SCC Technical Support Document “the purpose of the [SCC] estimates...is to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO₂) emissions into cost-benefit analyses of regulatory actions that have small, or ‘marginal,’ impacts on cumulative global emissions.” Technical Support Document:

Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 February 2010 (withdrawn by EO 13783). The SCC protocol was thus created to meet the requirements for regulatory impact analyses during rule making.

The decision was made not to expand the use of the SCC protocol for the FMG RMPA/EIS for a number of reasons. Most notably, this action is not a rule making for which the SCC protocol was originally developed. Second, on March 28, 2017, the president issued Executive Order 13783 which, among other actions, withdrew the Technical Support Documents on which the protocol was based and disbanded the earlier IWG on Social Cost of Greenhouse Gases.

The EO further directed agencies to ensure that estimates of the social cost of greenhouse gases used in regulatory analyses “are based on the best available science and economics” and are consistent with the guidance contained in OMB Circular A-4, “including with respect to the consideration of domestic versus international impacts and the consideration of appropriate discount rates” (EO 13783, Section 5(c)).

In compliance with OMB Circular A-4, interim protocols have been developed for use in the rulemaking context; however, the circular does not apply to project decisions, so there is no executive order requirement to apply the SCC protocol to project decisions.

Further, NEPA does not require a cost-benefit analysis (40 CFR 1502.23), although it does require consideration of economic and social effects (40 CFR 1508.8(b)). A complete monetary cost-benefit analysis would analyze the social benefits of the proposed action for society as a whole, as well as other potential positive benefits. Providing solely an SCC cost analysis would be unbalanced, potentially inaccurate, and not useful in facilitating the BLM and BIA Authorized Officers’ decisions.

Any increased economic activity, in terms of revenue, employment, labor income, total value added, and output, that is expected to occur with the proposed action is simply an economic impact, rather than an economic benefit. This is because such impacts might be viewed as negative or undesirable due to a potential increase in local population, competition for jobs, and concerns that changes in population would change the quality of the local community. Economic impact is distinct from economic benefit, as defined in economic theory and methods; the socioeconomic impact analysis required under NEPA is distinct from a cost-benefit analysis, which is not required.

Finally, the SCC protocol does not measure the actual incremental impacts of a project on the environment and does not include all damages or benefits from carbon emissions. The SCC protocol estimates economic damages associated with an increase in carbon dioxide emissions; this is typically expressed as a 1 metric ton increase in a single year. It includes potential changes in net agricultural productivity, human health, and property damages from increased flood risk over hundreds of years. The estimate is developed by aggregating results “across models, over time, across regions and impact categories, and across 150,000 scenarios” (Rose et al. 2014). The dollar figure arrived at is based on the SCC calculation and represents the value of damages avoided if, ultimately, there is no increase in carbon emissions. But the dollar cost is generated in a range and provides little benefit to assist the BLM and BIA in their project-level analyses.

To summarize, SCC is not undertaken in this analysis because of the following:

- It is not engaged in a rulemaking for which the protocol was originally developed.
- The IWG, technical supporting documents, and associated guidance have been withdrawn.
- NEPA does not require cost-benefit analysis.

The full social benefits of carbon-based energy production have not been monetized, and quantifying only the costs of GHG emissions but not the benefits would yield information that is both potentially inaccurate and not useful.

3.2 RFD SCENARIO PROJECTIONS

The 2019 RFD Scenario for Oil and Gas Activities for the Mancos-Gallup RMPA Planning Area (**Appendix I**) describes historical production amounts and oil and gas activity levels in the San Juan Basin and the planning area. It also projects estimated production amounts and activity levels through the 20-year planning period. Because the BLM alternatives consider varying allocation decisions for closing areas to fluid mineral leasing or applying major or moderate constraints, the projections of activity in the BLM mineral decision area vary by alternative. These projections similarly vary for the overall planning area, since changes in projected development on federal mineral estate would be reflected in the projections for the planning area. However, the projections for oil and gas activity in the BIA mineral decision area do not vary by alternative. This is because the actions considered in the BIA alternatives do not create measurable areas with closures or major or moderate constraints. **Table 3-1** lists the RFD projections for future oil and gas activity in the BLM mineral decision area, BIA mineral decision area, and the whole planning area.

3.3 CUMULATIVE IMPACTS

Evaluating potential cumulative impacts considers incremental impacts that could occur from the proposed project and impacts from past, present, and reasonably foreseeable future actions. These evaluations involve determinations that often are complex and, to some degree, subjective.

3.3.1 Cumulative Analysis Method

The cumulative impacts discussion that follows considers the alternatives in the context of the broader human environment, specifically actions that occur outside the scope or geographic area covered by the FMG RMPA/EIS. The cumulative impact analysis is limited to important issues of national, regional, or local significance; therefore, not all resources identified for the direct and indirect impact analysis in the FMG RMPA/EIS are analyzed for cumulative impacts.

Because of the programmatic nature of an RMPA/EIS and cumulative impacts assessment, the analysis tends to be broad and generalized. This is in order to address the impacts that could occur from a reasonably foreseeable management scenario, combined with other reasonably foreseeable activities or projects; consequently, this assessment is primarily qualitative for most resources because of a lack of detailed information that would result from project-level decisions and other activities or projects.

Quantitative information is used whenever available and as appropriate to portray the magnitude of an impact (e.g., when discussing RFD projections). The analysis assesses the magnitude of cumulative impacts by comparing the environment in its baseline condition with the expected impacts of the alternatives and other actions in the same geographic area. The magnitude of an impact is determined through a comparison of anticipated conditions against the baseline, as depicted in the affected environment (Affected Environment Supplemental Report), or the long-term resilience of a resource or social system.

The following factors were considered in this cumulative impact assessment:

- Federal, Tribal, nonfederal, and private actions
- Potential for combined impacts or combined interaction between impacts
- Potential for impacts across political and administrative boundaries
- Other spatial and temporal characteristics of each affected resource
- Comparative scale of cumulative impacts across alternatives

Temporal and spatial boundaries used in the cumulative analysis are developed on the basis of resources of concern and actions that might contribute to an impact. The baseline year for the cumulative impacts analysis is 2018. The time frame of this analysis is the life of the RMPA, which is 20 years.

**Table 3-1
RFD Projections by Alternative**

Activity	Baseline Unconstrained RFD	No Action Alternative	Alternative A	Alternative B1	Alternative B2	Alternative C1	Alternative C2	Alternative C3	Alternative C4	Alternative C5	Alternative C6	Alternative D
Total Planning Area¹												
Number of new wells	3,200	3,093	2,619	2,622	2,345	3,085	3,082	3,079	3,076	3,068	3,073	3,101
% reduction in wells (vs. baseline)	0.0%	3.3%	18.2%	16.0%	26.7%	3.6%	3.7%	3.8%	3.9%	4.1%	4.0%	3.1%
New surface disturbance (acres)	18,500	18,200	16,400	16,600	15,500	18,100	18,100	18,100	18,000	18,100	18,100	18,200
BLM Mineral Decision Area												
New wells	1,980	1,873	1,399	1,462	1,125	1,865	1,862	1,859	1,856	1,848	1,853	1,881
% reduction in wells (vs. baseline)	0.0%	5.3%	29.9%	26.9%	43.2%	5.8%	6.0%	6.1%	6.3%	6.7%	6.4%	5.0%
New surface disturbance (acres)	11,800	11,400	9,600	9,900	8,700	11,300	11,300	11,300	11,300	11,300	11,300	11,400
BIA Mineral Decision Area²												
New wells	510	510	510	510	N/A	N/A	N/A	N/A	N/A	N/A	N/A	510
Navajo Tribal trust fluid minerals	141	141	141	141	N/A	N/A	N/A	N/A	N/A	N/A	N/A	141
Individual Indian allotted fluid minerals	369	369	369	369	N/A	N/A	N/A	N/A	N/A	N/A	N/A	369

3. Affected Environment and Environmental Consequences (Table 3-1: RFD Projections by Alternative)

Activity	Baseline Unconstrained RFD	No Action Alternative	Alternative A	Alternative B1	Alternative B2	Alternative C1	Alternative C2	Alternative C3	Alternative C4	Alternative C5	Alternative C6	Alternative D
New surface disturbance (acres)	2,100	2,100	2,100	2,100	N/A	2,100	N/A	N/A	N/A	N/A	N/A	2,100
<i>Navajo Tribal trust fluid minerals</i>	650	650	650	650	N/A	650	N/A	N/A	N/A	N/A	N/A	650
<i>Individual Indian allotted fluid minerals</i>	1,450	1,450	1,450	1,450	N/A	1,450	N/A	N/A	N/A	N/A	N/A	1,450

Source: Appendix I; See Supplemental Tables C and D for further information behind surface disturbance estimates.

¹Total planning area projected development includes state and fee minerals in the planning area.

²The BIA is not considering any sub-alternatives for its Alternative C at this time.

Spatial boundaries vary and are larger for resources that are mobile or that migrate, such as elk, compared with stationary resources. Occasionally, spatial boundaries can be contained in the planning area. Spatial boundaries were developed to facilitate the analysis and are included under the appropriate resource section heading.

3.3.2 Past, Present, and Reasonably Foreseeable Future Actions

Projects and activities identified as having the greatest likelihood to generate potential cumulative impacts when added to the FMG RMPA/EIS alternatives are displayed in **Table 3-2**.

**Table 3-2
Past, Present, and Reasonably Foreseeable Projects, Plans, or Actions that Comprise the
Cumulative Impact Scenario**

Past Projects, Plans, or Actions	
Human Actions	
Land Use Plans	The original RMP for the BLM FFO (the 2003 RMP) was finalized in 1988 and underwent subsequent amendments. The 1988 RMP was amended six times between 1990 and 2000. The ROD for the 2003 RMP was completed on September 29, 2003.
Energy and Minerals Development	<u>Oil and Gas Leasing.</u> The 2019 RFD estimates that 37,307 wells were drilled through August 2017 within the FMG RMPA/EIS planning area (BLM 2019). This includes 24,825 gas wells (67%), 2,249 oil wells (6%), 208 injection wells (0.5%), and 9,638 abandoned wells (26%). The remaining 387 wells (1%) consist of 3 carbon dioxide wells, 51 saltwater disposal wells, 63 wells in pre-productive status (start, at total depth, and treated), and 270 wells in nonproductive status (pilot, service, observation, suspended, and temporarily abandoned). As of 2017, existing wells in the planning area were associated with 56,500 acres of surface disturbance. <u>Salable Minerals.</u> The FFO has approximately 210 mineral material sites in the planning area. Most of these are small sandstone pits used for road maintenance under a free use permit. <u>Renewable Energy.</u> No past authorizations.
Lands and Realty	<u>Land Tenure.</u> See present actions. <u>Land Use Authorizations.</u> In the planning area, the number of ROW actions based on authorizations has been variable. The highest number (11,114) occurred in 2004, and the lowest (716) was in 2006. The average between 2003 and 2017 was approximately 2,047 actions per year (BLM-FFO 2018). Other land use authorizations include three temporary use permits for film production.
Livestock Grazing and Agriculture	Livestock grazing has a long history in the region, although, generally, it has decreased over the past 100 years. Grazing in portions of the planning area has either remained stable or declined since the late twentieth century. Infrastructure on BLM-managed lands, National Forest System lands, and other state and private lands, including range improvements to support livestock grazing, consists of stock water pipelines, watering sites (including those for reservoirs and reservoir reconstructions), pits and stock tanks, windmills, cattle guards, and fences.
Travel and Transportation Management	Visitors have travelled off designated or existing routes and have created administrative trails; this would likely continue in the decision area.
Vegetation	Chemical and physical vegetation treatments have been implemented in the planning area since the 1950s. The sagebrush community has undergone the majority of treatments, particularly with herbicide to thin sagebrush density, since the 1990s. Seedings have included both native and desirable nonnative species.
Forestry	Historical noncommercial gathering and cutting levels over the past 5 years have increased, as a result of salvage operations in response to insect and disease outbreaks and other natural disturbances. Fuel wood sales have averaged 400 cords per year.

3. Affected Environment and Environmental Consequences (Cumulative Impacts)

Past Projects, Plans, or Actions	
Human Actions	
Wildlife and Special Status and Listed Species Management	<p>The final EIS for Southern Rockies Lynx Amendment was issued in summer 2007. It assessed guidelines for managing Canada lynx on certain lands under the authority of the Forest Service and the BLM (Forest Service 2007).</p> <p>Interim Guidance for Clovers Cactus Management was released in 2016–2017.</p> <p>The Mule Deer Winter Drilling Research Project was to allow winter drilling of natural gas wells on existing pads in the Rosa Wildlife Area. The wells were never drilled; however, the telemetry study continued, which resulted in the identification of a migratory corridor. Some data were collected to support evaluating the effects of activity on wintering mule deer.</p>
Water Use	<p>There are roughly 5,236 OSE water wells registered in the planning area (New Mexico Office of the State Engineer [NMOSE]/Interstate Stream Commission [ISC] 2018).</p> <p>Numerous New Mexico Oil Conservation Division (NMOCD)-required groundwater monitoring wells have been drilled throughout the planning area.</p>
Present Projects, Plans, or Actions	
Human Actions	
Energy and Minerals Development	<p><u>Oil and Gas Leasing.</u> See past actions. There are currently 1,195,500 acres of BLM surface with underlying federal mineral estate open to leasing, with 678,800 acres of non-BLM surface with underlying federal mineral estate open to leasing. There are currently 593,500 acres in the BIA mineral decision area open to leasing, and 383,200 acres include both the surface and the mineral estate.</p> <p><u>Coal.</u> The FFO currently has two active coal operations in the planning area.</p> <p><u>Four Corners Power Plant and Navajo Mine Energy Project.</u> This project would extend the life of the Four Corners Power Plant to 2041, would renew rights-of-way for existing electrical transmission lines, and would allow for development of a new mine area, referred to as the Pinabete Mine Permit area, in the existing Navajo Mine Lease. The ROD for this project was signed in July 2015.</p> <p><u>Salable Minerals.</u> The FFO has approximately 245 salable mineral operations in the planning area. Approximately 220 of these operations are sandstone pits of less than 5 acres. Large commercial sand and gravel operations and humate operations make up the remainder. In 2017, the FFO processed approximately 43 new salable mineral applications for sandstone.</p> <p><u>Renewable Energy.</u> There are three applications for solar projects: two on private land and one on BLM-managed land in the planning area.</p>
Lands and Realty	<p><u>Land Tenure.</u> There are lands available for sale, exchange, or conveyance by the federal government in the planning area (BLM GIS 2018), but there are no pending land sales. Also, there are no pending acquisitions, land exchanges, or purchase actions in the planning area. Currently, the FFO receives very few land tenure adjustment requests per year.</p>
Livestock Grazing and Agriculture	<p>Approximately 1,276,019 acres in the FFO are currently active BLM grazing permits or leases. Additionally, the BIA issues grazing leases on Navajo Tribal trust land, individual Indian allotments, and BLM-managed land (under an agreement with the BLM and the Navajo Nation).</p>
Vegetation Management	<p><u>Hazardous Fuels Reduction.</u> A Fire Management Plan is currently being developed. Vegetation management projects are planned at site-specific levels.</p>
Forestry	<p>The BIA is currently developing an Integrated Resource Management Plan (IRMP) "...to provide the Navajo Nation Forestry Department with guidance on how best to manage, conserve and enhance forestlands" (https://navajoirmp.wixsite.com/irmp).</p>

Present Projects, Plans, or Actions	
Human Actions	
Natural Processes	
Spread of Noxious and Invasive Weeds	Noxious weeds have invaded many locations in the planning area, carried by wind, humans, machinery, and animals. The FFO currently manages weed infestations through integrated weed management, including biological, chemical, mechanical, manual, and educational methods, primarily through weed control cooperative range improvement agreements.
Wildland Fire and Fuels	A Fire Management Plan is being developed
Reasonably Foreseeable Future Projects, Plans, or Actions	
Human Actions	
Energy and Minerals Development	<p><u>Oil and Gas Leasing.</u> The RFD scenario for oil and gas activities in the planning area summarizes fluid mineral development in the FFO and gives a future development scenario based on unconstrained development (Appendix I).</p> <p><u>Coal.</u> Continued development of federal coal or oil shale resources is anticipated in the planning area for the life of the FMG RMPA/EIS.</p> <p><u>Salable Minerals.</u> Salable mineral activity is expected to continue at roughly the same level, with the fluctuation in sandstone pits following the trend of new oil and gas development.</p> <p><u>Renewable Energy.</u> There is some potential for land use authorizations for renewable energy projects, such as wind and solar. There are three applications for solar projects: two on private land and one on BLM-managed land in the planning area. Due to the expected closure of area power plants, there has been an increase of interest in renewable energy development.</p>
Livestock Grazing	Overall, grazing in the planning area is expected to remain stable or to slightly decrease as residential and recreation development increase. Drought and water availability in the planning area have a substantial impact on annual livestock grazing operations.
Special Status and Listed Species Management	New habitat conservation plans could be developed for listed species. If additional species are listed as threatened or endangered, habitat conservation plans also would be developed for their designated habitat.
Water Use	<p>Hydraulic fracturing of the projected wells would require an estimated 60 million barrels (2.5 billion gallons) of water, assuming all wells would be hydraulically fractured and that no other technologies like using nitrogen would be used to augment the water or reduce water consumption, which may not be the case (see Appendix I).</p> <p><u>San Juan River Navajo Irrigation Rehabilitation and Improvement Project.</u> This project would convert earthen ditches to pressurized pipelines and provide mitigation habitat to offset losses from salinity control measures.</p> <p><u>Navajo-Gallup Water Supply Project.</u> The proposed project would convey a reliable water supply to the eastern section of the Navajo Nation, the southwestern part of the Jicarilla Apache Nation, and the city of Gallup via diversions from the San Juan River in northern New Mexico.</p>

3.4 RESOURCES

3.4.1 Air Resources

Affected Environment

Regulatory considerations, indicators, current conditions, and trends in air quality in the region are all discussed, particularly their relationship to criteria air pollutants, hazardous air pollutants, visibility, and atmospheric deposition.

Air Quality

Criteria Pollutants. Under the authority of the Clean Air Act (CAA), the US Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants: carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, lead, and two categories of particulate matter (particulate matter less than 10 microns in diameter [PM₁₀] and particulate matter less than 2.5 microns in diameter [PM_{2.5}]). These pollutants, except for lead, are used as indicator pollutants for the FMG RMPA/EIS air analysis. Emissions of lead in the planning area due to oil and gas development are extremely low (BLM, Ramboll Environ US Corporation, and Kleinfelder, Inc. 2016); therefore, lead is not discussed further. Volatile organic compounds (VOCs), which can serve as a precursor pollutant to ozone formation, also are used as an indicator pollutant. Detailed information on each criteria pollutant, as well as sources of criteria pollutant emissions in the planning area, is provided in the BLM New Mexico State Office's Air Resources Technical Report for Oil and Gas Development (BLM 2018c). NAAQS and New Mexico Ambient Air Quality Standards (AAQS), which are a set of regulations implemented by New Mexico's Air Quality Act (20.2.3 NMAC), are shown in **Table 3-3**.

**Table 3-3
National, Tribal, and New Mexico Ambient Air Quality Standards**

Pollutant	Averaging Time	National Standards/Navajo Standards			New Mexico Standard ⁴
		Primary	Secondary	Form	
Ozone	8-hour	0.070 ppm ¹	Same as primary	Annual 4th-highest daily max. 8-hr concentration, averaged over 3 years	—
Carbon monoxide	8-hour	9 ppm	—	Not to be exceeded more than once per year	8.7 ppm
	1-hour	35 ppm	—		13.1 ppm
Nitrogen dioxide	Annual (arithmetic mean)	53 ppb ²	Same as primary	Annual mean	0.05 ppm
	24-hour	—	—	—	0.10 ppm
	1-hour	100 ppb	—	98th percentile of 1-hour daily maximum concentration, averaged over 3 years	—
Sulfur dioxide	Annual (arithmetic mean)	—	—	—	0.02 ppm
	24-hour	—	—	—	0.10 ppm
	3-hour	—	0.5 ppm	Not to be exceeded more than once per year	—
	1-hour	75 ppb	—	99th percentile of 1-hour daily max. concentrations, averaged over 3 years	—
Particulate Matter (PM ₁₀)	24-hour	150 µg/m ³	Same as primary	Not to be exceeded more than once per year on average over 3 years	—
Particulate Matter (PM _{2.5})	Annual (arithmetic mean)	12 µg/m ³	15 µg/m ³	Annual mean, averaged over 3 years	—
	24-hour	35 µg/m ³	Same as primary	98th percentile, averaged over 3 years	—

Pollutant	Averaging Time	National Standards/Navajo Standards			New Mexico Standard ⁴
		Primary	Secondary	Form	
Lead ³	Rolling 3-month average	0.15 µg/m ³	Same as primary	Not to be exceeded	—
Total reduced sulfur	0.5 hour	—	—	—	0.003 ppm
Hydrogen sulfide	1-hour (statewide)	—	—	—	0.010 ppm
	0.5 hour (within 5 miles of municipalities > 20,000)	—	—	—	0.003 ppm
Total reduced sulfur	0.5 hour	—	—	—	0.003 ppm

Sources: EPA 2019a; New Mexico Administrative Code 20.2.3

Cells with a dash (—) indicate that there is no standard for that pollutant or averaging time

¹ppm—parts per million. Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) ozone standards additionally remain in effect in some areas. Revocation of the previous (2008) ozone standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

²ppb—parts per billion. Final rule signed June 2, 2010. The 1971 annual and 24-hour sulfur dioxide standards (0.03 ppm annual and 0.14 ppm 24-hour) were revoked in that same rulemaking; however, these standards remain in effect until 1 year after an area is designated for the 2010 standard. One exception is in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

³µg/m³—micrograms per cubic meter. Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m³) remains in effect until 1 year after an area is designated for the 2008 standard. The one exception is in areas designated nonattainment for the 1978 standard, where the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

⁴The New Mexico AAQS for total suspended particulates were repealed on September 28, 2018.

Hazardous Air Pollutants. Hazardous air pollutant emissions used as indicators for the FMG RMPA/EIS include formaldehyde, n-hexane, benzene, toluene, ethylbenzene, and xylenes. All are pollutants emitted during well development and production (BLM, Ramboll Environ US Corporation, and Kleinfelder, Inc. 2016).

Hydrogen Sulfide. Hydrogen sulfide (H₂S) is a naturally occurring byproduct of oil and gas development in some oil and gas production zones, primarily in the New Mexico Permian Basin (BLM 2018c); H₂S also may occur in the planning area (BLM 2010a). While there is no NAAQS for H₂S, New Mexico has set a state AAQS (see **Table 3-3**). H₂S is also included on the federal Emergency Planning and Community Right-to-Know Act list as a toxic chemical. New Mexico regulates H₂S from oil and gas development and production through New Mexico Oil Conservation Division Rule 118. It requires that certain actions be taken to limit public exposure for wells, facilities, or operations with H₂S concentrations that exceed 100 ppm (NMOCD 2005). Detailed information on H₂S is provided in the Air Resources Technical Report for Oil and Gas Development (BLM 2018c).

Air Quality-Related Values

Air Quality-Related Values (AQRVs) are defined as resources that may be impaired by changes in air quality. The most notable examples of AQRVs are visibility and atmospheric deposition that can affect the scenic, cultural, physical, biological, ecological, or recreation areas of a region.

Part C of the CAA prohibits areas that are in attainment of the NAAQS from being polluted up to the level of the standards. The CAA mandates the EPA to classify areas as Class I, Class II, or Class III. Class I areas allow for minimal degradation of air quality to preserve the condition of those areas; Class II areas allow for a moderate degradation of air quality to allow for industrial growth; Class III areas allow for the greatest level of degradation, though the EPA has never designated any Class III areas. The Class I areas

nearest to the planning area boundary are shown in **Table 3-4**. There are no Tribal Class I areas in or near the planning area. Class II areas are the remaining areas in the United States, except for nonattainment and maintenance areas. The planning area is in a Class II area.

Table 3-4
Class I Areas Near the Planning Area

Area	Location
Mesa Verde National Park, Colorado	11 miles north
San Pedro Parks Wilderness, New Mexico	Adjacent to the southeast border of the planning area
Bandelier National Monument, New Mexico	29 miles southeast
Weminuche Wilderness	30 miles north

Sources: WFDSS GIS 2009; **Appendix J**, Figure 4-1

The National Park Service (NPS), USFWS, and Forest Service land managers may identify Class II lands under their jurisdiction that are sensitive to air pollution. These are referred to as sensitive Class II areas and may include wilderness areas, national wildlife refuges, national monuments, national historic parks, and national recreation areas that were not formally designated as Class I areas. Federal land managers identified sensitive Class II areas as part of the Colorado Air Resource Management Modeling Study (CARMMS) with Updated Mancos Shale Modeling (BLM, Ramboll Environ US Corporation, and Kleinfelder, Inc. 2016). Sensitive Class II areas in and near the planning area are shown in **Table 3-5** and on **Figure 4-1** in **Appendix J**.

Table 3-5
Sensitive Class II Areas in and Near the Planning Area

Area	Approximate Distance and Location from the Planning Area
CCNHP	In the planning area
Aztec Ruins National Monument	In the planning area
Canyon de Chelly National Monument	65 miles west
Monte Vista National Wildlife Refuge	55 miles northeast
Northern Rio Grande National Heritage Area	45 miles east
Petroglyph National Monument	55 miles southeast
El Malpais National Monument	65 miles south
South San Juan Wilderness	25 miles northeast
Cruces Basin Wilderness	30 miles east
Chama River Canyon Wilderness	10 miles east
Dome Wilderness	40 miles southeast
Sandia Mountain Wilderness	65 miles southeast

Sources: WFDSS GIS 2009; BLM, Ramboll Environ US Corporation, and Kleinfelder, Inc. 2016; **Appendix J**, Figure 4-1

Visibility. Visibility is monitored at four IMPROVE (Interagency Monitoring of Protected Visual Environments) stations near the planning area: Mesa Verde National Park, Weminuche Wilderness, San Pedro Parks, and Bandelier National Monument (see **Figure 3-1**, Air Quality Monitoring Stations). There has been a slight improvement in visibility on the 20 percent clearest days at all four monitoring stations since the early 2000s. Similarly, there has been a slightly improving trend in visibility on the 20 percent haziest days over this time frame, though there have been spikes in haze levels during specific years (BLM 2018c, Figure 1).

Deposition. There are no National Atmospheric Deposition Program (NADP) or Clean Air Status and Trends Network (CASTNET) monitoring stations in the planning area; however, data from the nearby CASTNET monitoring site at Mesa Verde National Park can be useful for estimating deposition rates in the planning area (BLM 2018c). Both nitrogen and sulfur deposition rates have shown a downward trend since monitoring began in 1995 (CSU 2019).

Current Conditions

The area of analysis can extend for up to 300 miles, as some pollutants are emitted directly, and others form through chemical reactions in the atmosphere, particularly in the presence of sunlight.

Attainment Status. All of the planning area is in attainment or unclassified for each of the NAAQS (EPA 2019b); however, air monitoring data show that 3-year average ozone concentrations in the planning area are within 95 percent of the 8-hour ozone NAAQS. Pursuant to New Mexico Statute 74-2-5.3, if the New Mexico Environment Department (NMED) determines that emissions from sources within its jurisdiction cause or contribute to ozone concentrations in excess of 95 percent of a national ambient air quality standard for ozone, it shall adopt a plan, including regulations, to control emissions of oxides of nitrogen and volatile organic compounds to provide for attainment and maintenance of the standard. The NMED has initiated an Ozone Attainment Initiative to address ozone levels in the area (NMED 2019). The Four Corners Air Quality Task Force was convened in 2005 to address air quality issues in the Four Corners region in light of continued energy development and growth in the region and consider options for mitigating air pollution. This task force published a report in 2007 detailing a wide range of mitigation options and continues to meet annually since that time as the Four Corners Air Quality Group (BLM 2018c).

Air Monitoring Data. The NMED manages the network of air monitoring stations in New Mexico, except in Bernalillo County and on Tribal lands. The Albuquerque-Bernalillo County Air Quality Control Board oversees air quality programs in Bernalillo County, while Tribal entities, such as the Navajo Nation, implement air quality programs on Tribal lands. There are five NMED monitoring stations and one NPS monitoring station (CCNHP) in the planning area. The Navajo Nation operates monitoring stations in Shiprock, New Mexico, and Apache County, Arizona, both west of the planning area.

There are six air monitoring stations in La Plata and Montezuma Counties, Colorado, immediately north of the planning area. These stations are operated by the Southern Ute Indian Tribe, the NPS, the Forest Service, or the Colorado Department of Public Health and Environment (CDPHE). Data from these monitoring stations are shown in **Table 3-6**. These data include the pollutants monitored, pollutant concentrations for the most recent 3 years of data, and the 3-year average concentration compared with the NAAQS. The locations of these monitors are shown on **Figure 3-1**, Air Quality Monitoring Stations, in **Appendix A**.

Monitoring data show that pollutant concentration levels are below NAAQS for monitored pollutants; however, ozone concentration levels are approaching or at the revised NAAQS for ozone at all monitoring stations listed.

**Table 3-6
Air Quality Monitoring Values in the Planning Area**

Pollutant	Averaging Time	2016	2017	2018	3-Year Average ¹	NAAQS	Percent of NAAQS ¹
NPS; Site ID 350450020; Chaco Culture NHP; San Juan County, New Mexico							
Ozone (ppm)	8-hour	—	0.064	0.068	—	0.070	—
Nitrogen dioxide (ppb)	Annual	—	0.76	0.68	—	53	—
	1-hour	—	11	5	—	100	—
NMED; Site ID 35-045-1005; Shiprock Electrical Substation; San Juan County, New Mexico							
Ozone (ppm)	8-hour	0.062	0.071	0.074	0.069	0.070	99
Nitrogen dioxide (ppb)	Annual	4.54	4.55	3.49	4.19	53	8
	1-hour	34	32	25	30.33	100	30
Sulfur dioxide (ppb)	1-hour	8	16	9	11	75	15
PM ₁₀ (µg/m ³)	24-hour	55	19	87	53.67	150	36

3. Affected Environment and Environmental Consequences (Air Resources)

Pollutant	Averaging Time	2016	2017	2018	3-Year Average ¹	NAAQS	Percent of NAAQS ¹
NMED; Site ID 35-045-0009; 2200 N 1st Street, Bloomfield; San Juan County, New Mexico							
Ozone (ppm)	8-hour	0.065	0.068	0.074	0.069	0.070	99
Nitrogen dioxide (ppb)	Annual	9.88	10.44	10.04	10.12	53	19
	1-hour	35	33	34	34	100	34
Sulfur dioxide (ppb)	1-hour	2	2	2	2	75	3
NMED; Site ID 35-045-0018; 423 Highway 539, Navajo Dam; San Juan County, New Mexico							
Ozone (ppm)	8-hour	0.067	0.069	0.074	0.070	0.070	100
Nitrogen dioxide (ppb)	Annual	5.64	5.51	5.95	5.7	53	11
	1-hour	25	28	23	25.33	100	25
NMED; Site ID 35-039-0026; 21 New Mexico 96, Coyote; Rio Arriba County, New Mexico							
Ozone (ppm)	8-hour	0.063	0.070	0.070	0.068	0.070	97
NMED; Site ID 350431001; 600 Oak Street, Bernalillo; Sandoval County, New Mexico							
Ozone (ppm)	8-hour	0.064	0.067	0.073	0.068	0.070	97
Navajo Nation; Site ID 35-045-1233 Shiprock; San Juan County, New Mexico							
Ozone (ppm)	8-hour	0.064	0.061	0.069	0.065	0.070	92
Nitrogen dioxide (ppb)	Annual	4.74	7.35	3.13	5.07	53	10
	1-hour	28	31	23	27.33	100	27
Sulfur dioxide (ppb)	1-hour	7	7	11	0.06	75	92
Navajo Nation; Site ID 04-001-1235; Nazlini; Apache County, Arizona							
PM _{2.5} -Monitor 1 (µg/m ³)	24-hour	9	7	4	6.67	35	19
	Annual	2.3	2.6	2.0	2.30	12	19
PM _{2.5} -Monitor 2 (µg/m ³)	24-hour	9	7	8	8.00	35	23
	Annual	2.4	2.7	2.5	2.53	12	21
Southern Ute Indian Tribe; Site ID 08-067-7001; Ignacio on County Road 517; La Plata County, Colorado							
Ozone (ppm)	8-hour	0.071	0.069	0.067	0.069	0.070	99
Nitrogen dioxide (ppb)	Annual	4.23	4.63	4.21	4.36	53	8
	1-hour	23	22	19	21.33	100	21
Carbon Monoxide (ppm)	8-hour	1.3	1	0.6	0.97	9	11
	1-hour	5.1	1.1	1.3	2.5	35	7
PM _{2.5} (µg/m ³)	24-hour	6	—	—	—	35	—
	Annual	2.9	—	—	—	12	—
Southern Ute Indian Tribe; Site ID 08-067-7003; 7571 Highway 550; La Plata County, Colorado							
Ozone (ppm)	8-hour	0.072	0.069	0.067	0.069	0.070	99
Nitrogen dioxide (ppb)	Annual	5.01	5.66	5.35	5.34	53	10
	1-hour	22	27	26	25.00	100	25
PM _{2.5} -Monitor 1 (µg/m ³)	24-hour	7	6	33	15.33	35	44
	Annual	3.2	—	—	—	12	—
PM _{2.5} -Monitor 3 (µg/m ³)	24-hour	7	9	7	7.67	35	22
	Annual	3.3	—	—	—	12	—
CDPHE; Site ID 08-067-0004; 1235 Camino Del Rio, Durango; La Plata County, Colorado							
PM ₁₀ (µg/m ³)	24-hour	104	38	147	96.3	150	64
Forest Service; Site ID 08-067-1004; Weminuche Wilderness Area; La Plata County, Colorado							
Ozone (ppm)	8-hour	0.065	0.066	0.071	0.067	0.070	96
Nitrogen dioxide (ppb)	Annual	1.04	0.81	1.13	0.99	53	2
	1-hour	7	10	7	8	100	8

Pollutant	Averaging Time	2016	2017	2018	3-Year Average ¹	NAAQS	Percent of NAAQS ¹
NPS; Site ID 08-083-0101; Mesa Verde National Park; Montezuma County, Colorado							
Ozone (ppm)	8-hour	0.066	0.066	0.072	0.068	0.070	97
CDPHE; Site ID 08-083-0006; 106 W. North St, Cortez; Montezuma County, Colorado							
Ozone (ppm)	8-hour	0.064	0.059	0.067	0.063	0.070	90

Source: EPA 2019c

Cells with an em dash (—) indicate that no monitoring data were available for that year for that monitor or pollutant. If data were not available for a given year, then the 3-year average and percent of NAAQS were not calculated.

¹ 3-year averages and percent of NAAQS were calculated only for monitoring stations with 3 consecutive years of data.

In February 2016, the Navajo Nation Environmental Protection Agency (NNEPA) Air Quality Control Program entered into an agreement with the Counselor Chapter of the Navajo Nation to monitor ambient SO₂, PM₁₀, ozone, and NO₂ in the vicinity of Counselor, New Mexico. This monitoring was done due to concerns by residents that oil and gas development was affecting local air quality. NNEPA set up an EPA-compliant monitoring station to collect data for 1 year (see **Figure 3-1** for location information). The observed criteria air pollutant concentrations are shown in **Table 3-7** and depicted on **Figure 3-2**, NO₂, SO₂, and Ozone Air Monitoring Data, Counselor, New Mexico, 2016-2017, and **Figure 3-3**, PM₁₀ Air Monitoring Data, Counselor, New Mexico, 2016-2017. As shown in this table and figures, criteria pollutant concentrations did not exceed their respective NAAQS values. NO₂ and SO₂ concentrations were well below the NAAQS for each pollutant, while ozone and PM₁₀ concentrations were approaching their respective NAAQS values.

Table 3-7
Air Quality Monitoring Values at Counselor Chapter (2016-2017)

Pollutant	Measured Concentration	NAAQS
Nitrogen Dioxide	29.4 ppb	100 ppb
Sulfur Dioxide	7 ppb	75 ppb
Ozone	67.5 ppb	70 ppb
PM ₁₀	140.8 µg/m ³	150 µg/m ³

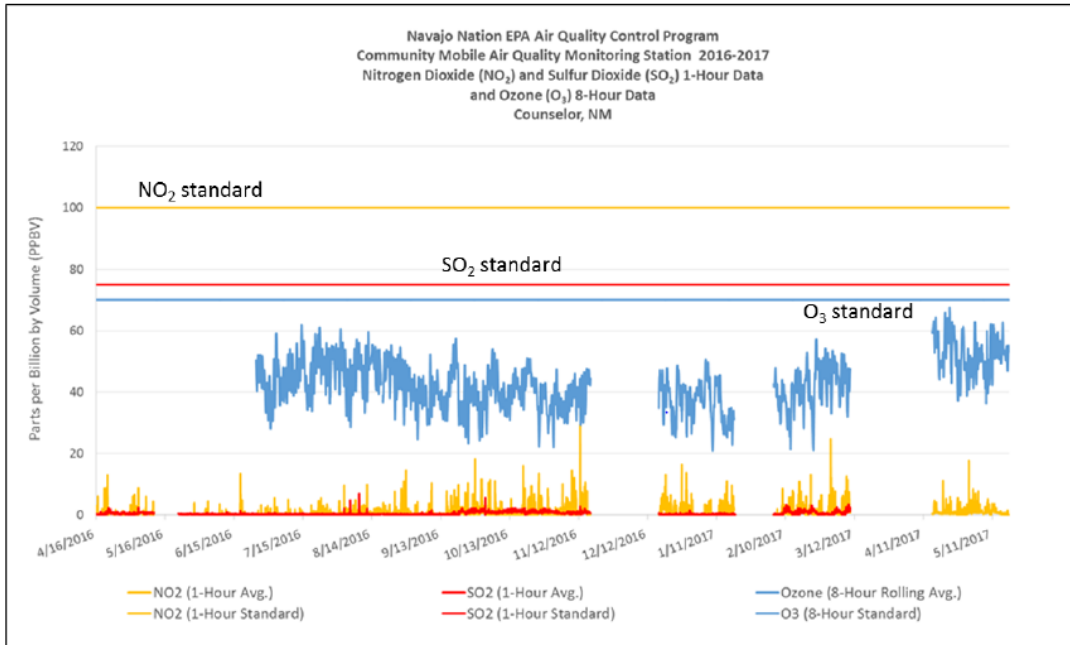
Source: NNEPA 2017a

The Counselor Chapter conducted a separate health impact assessment to document health concerns expressed by community members and to investigate certain water and air quality conditions in the Counselor-Nageezi area. Air sampling conducted as part of the health impact assessment found levels of H₂S to be above the EPA reference level for long-term exposure at one location. The air sampling also detected airborne chemicals—toluene, ethyl acetate, A-pinene, and propane—at levels that did not pose a risk to human health. Because the method for conducting the sampling was not provided, it is difficult to evaluate the conclusions (Counselor Health Impact Assessment Committee 2017).

Trends

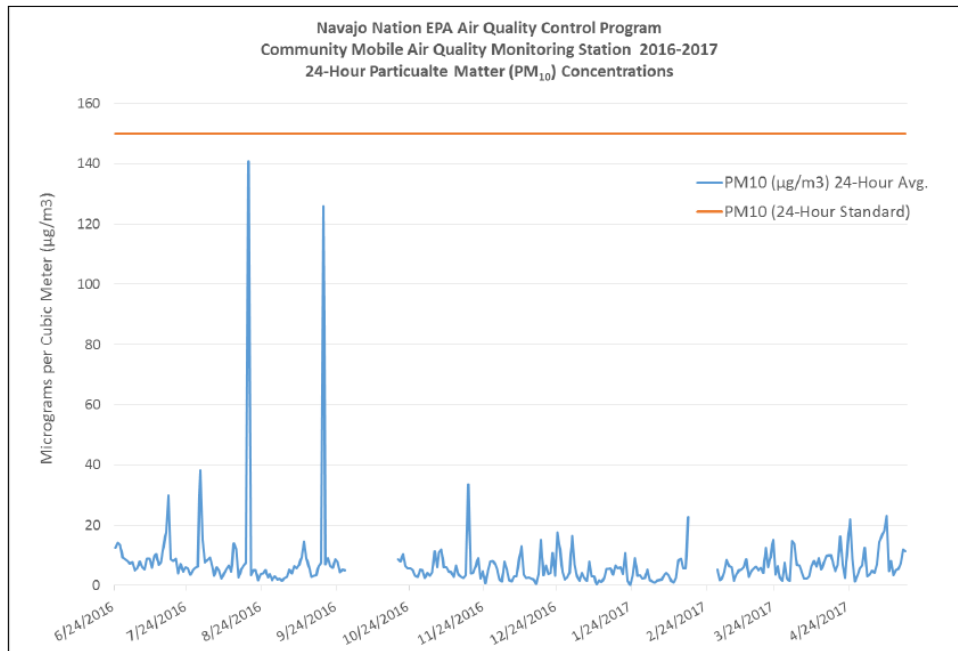
In 2007, criteria air pollutants, notably ozone, nitrogen oxides, and particulate matter, showed trends of increasing concentrations due to increased oil and gas production, energy generation from power plants, and general growth in the region. Increased ozone levels, and VOCs in particular, were the result of supplemental oil and gas development, as well as energy generating plants being constructed in the planning area (Four Corners Air Quality Task Force 2007). Since that time, the changes described below were implemented to address ozone concerns in the region.

Figure 3-2
NO₂, SO₂, and Ozone Air Monitoring Data, Counselor, New Mexico, 2016-2017



Source: NNEPA 2017a

Figure 3-3
PM₁₀ Air Monitoring Data, Counselor, New Mexico, 2016-2017



Source: NNEPA 2017a

In 2013, the NMED, the Public Service Company of New Mexico (PNM), and the EPA approved the termination of two units at San Juan Generating Station and subsequent installation of selective non-catalytic reduction technology at the remaining units by the end of 2017. These actions helped meet the requirements of the federal haze rule and significantly reduced the emissions levels of several pollutants. Expected results included reductions of 67 percent in sulfur dioxide, 62 percent in nitrogen oxides, 50 percent in particulate matter, 44 percent in carbon monoxide, 51 percent in VOCs, 50 percent in carbon dioxide, and 50 percent in mercury (BLM 2018c).

In addition to the shutdown of the two units at the San Juan Generating Station, three coal-fired generators were shut down at the Four Corners Power Plant in December 2013. In 2018, selective catalytic reduction technology was installed at the remaining two coal-fired generators, satisfying the EPA's best available retrofit technology requirements. Like the changes to the San Juan Generating Station, this action will meet federal regional haze rule requirements and reduce emissions. Expected results include a reduction of 36 percent of nitrogen oxides, 61 percent of mercury, 43 percent of particulate matter, 30 percent of carbon dioxide, and 24 percent of sulfur dioxide (BLM 2018c).

In 2014, a memorandum on Mancos Shale oil and gas emissions showed that recent trends in gas production in the south San Juan Basin point to a consistent decline since 2006; this is a reversal, compared with the previous decade. Between 2006 and 2013, gas production dropped an average of 42 billion cubic feet (BCF) per year; between 2012 and 2013, gas production dropped 64 BCF, the largest decline in production over this period. The report authors predicted that in a 10-year period, between 2011 and 2021, the average rate of decline would lead to a 420 BCF drop in production, while the most recent maximum rate of decline would lead to a decrease of 640 BCF (BLM, Ramboll Environ US Corporation, and Kleinfelder, Inc. 2016).

The PNM issued an Integrated Resource Plan in July 2017. The purpose of this plan, which is updated every 3 years, is to identify the most cost-effective resource mix that would meet the projected electricity demands of its customers over the next 20 years. This plan recommended eliminating coal-fired generation from its energy portfolio by 2031 to provide a long-term cost savings to its customers. Under this scenario, the San Juan Generating Station would be retired in 2022, and the PNM would exit its 13 percent share in the Four Corners Power Plant after 2031 (PNM 2017). The New Mexico Public Regulation Commission must approve this plan before it can be implemented.

The Arizona Public Services Electric Company owns most of the Four Corners Power Plant. It released its integrated resource plan in April 2017 (Arizona Public Services Electric Company 2017). Under this plan, it would continue operations at Four Corners Power Plant but would reduce emissions by installing selective catalytic reduction technology in 2018, as described above. It also would replace older gas-fired turbines with new turbines and modernized air pollution controls in 2019.

Overall, air pollutant concentrations, such as ozone, nitrogen oxides, and particulate matter, increased as recently as 2006. These increases negatively influenced air resources in the region, including increased deposition rates of mercury and nitrogen and reduced visibility near Class I areas. Since 2006 this trend has reversed, largely due to new regulations limiting emissions from oil and gas development and coal-fired power plants and changing technologies. This trend of decreased air pollutant emissions and continued improvement in AQRVs would likely continue due to the planned actions at area power-generating facilities described above and reductions in gas production predicted to continue through 2021; however, the rate or direction of this trend may slow or reverse if production of oil and gas development were to increase in the planning area for other reasons, such as favorable economic conditions or continued new technological advances in the industry, or if there were changes in the state or federal regulatory environment.

Climate

The planning area experiences an arid continental climate characterized by cool, dry winters and warm, dry summers. The climate is characterized by an abundance of sunshine and clear skies, leading to large variations between daytime and nighttime temperatures. Average total precipitation is highest in the late summer and

fall, as moisture from the Gulf of Mexico travels through the region. Oceanic moisture has little influence on climate due to the distance between the two areas. Winds typically originate from the west or southwest, although local wind conditions are highly variable due to the diverse topography in the planning area. Elevated and mountainous portions of the planning area experience colder and wetter conditions than other portions of the planning area.

A summary of monthly temperature and precipitation data for six towns or cities in the planning area is provided in the Affected Environment Supplemental Report, Section AE.2.1 Air Resources. It illustrates typical climate norms in the region, which are 3-decade averages of climatological variables produced by the National Oceanic and Atmospheric Administration (NOAA) and National Climatic Data Center (NCDC). Summary tables of these data were obtained from the Western Regional Climate Center (WRCC).

Climate Change and Greenhouse Gas Emissions

This section provides an overview of the sources and levels of greenhouse gas emissions at a global, state, and national scale. Information on how climate change is affecting specific resources and resource uses in the planning area is described under *Trends* in the individual resource sections in this chapter. Detailed information on climate, climate change, and greenhouse gases can be found in the Air Resources Technical Report for Oil and Gas Development (BLM 2018c) and the Cumulative BLM New Mexico Greenhouse Gas Emissions Supplemental White Paper (BLM 2019).

Global Emissions. The World Resources Institute's (WRI's) Climate Analysis Indicators Tool provides data on GHG emissions from 186 countries and all 50 states (WRI 2019a). In 2014, the most recently reported year, global GHG emissions were 45,741 million metric tons of carbon dioxide equivalent (MMT CO_{2e}).

US Emissions. The most recent GHG emission inventory prepared by the EPA reported that US GHG emissions were 6,457 MMT CO_{2e} in 2017. Electricity generation, transportation, and industry were the largest sources of GHGs in 2017, at 28 percent, 29 percent, and 22 percent, respectively. The contribution of GHGs from the energy sector in 2017 was over 84 percent of total US emissions; the energy sector includes fossil fuel combustion, nonenergy fuel use, natural gas systems, petroleum systems, coal mining, and waste incineration (EPA 2019d).

State Emissions. The New Mexico Greenhouse Gas Inventory and Reference Case Projection 1990-2020 projects GHG emissions of 101.7 MMT CO_{2e} in 2020, an increase of 48 percent relative to 1990 and 23 percent relative to 2000 (BLM 2019). The Inventory of New Mexico Greenhouse Gas Emissions: 2000-2013 lists total statewide gross GHG emissions in 2013 as 80.9 MMt CO_{2e} (NMED 2016). GHG emissions in New Mexico increased 3 percent annually from 1990 to 2000 but decreased by 6 MMT CO_{2e} from 2000 to 2013. The largest sources of GHG emissions in 2013 were electricity generation (35 percent), the fossil fuel industry (26 percent), and transportation fuel use (17 percent). The fossil fuel industry emissions (from production, processing, and transportation of natural gas, oil, and coal) in 2013 were 21.1 MMT CO_{2e}, the lowest since 2000 and a sharp decline from 2010 (NMED 2016).

Planning Area Emissions. The EPA's 2014 National Emissions Inventory included emissions of carbon dioxide, methane, and nitrous oxide for some source categories in planning area counties (EPA 2016a); these emissions are reported in the BLM's Affected Environment Supplemental Report.

The EPA Facility Level Information on Greenhouse Gases Tool (FLIGHT; EPA 2019e) database reports annual GHG emissions from facilities emitting more than 25,000 metric tons of CO_{2e} per year that are subject to the EPA's Greenhouse Gas Reporting Program (GHGRP) under 40 CFR 98. This includes emissions from most large, stationary sources of GHGs (smaller emitters are not required to report) and emissions from most end uses of fossil fuels. Nationally, the GHGRP accounts for 85 to 90 percent of total GHG emissions accounted for in the EPA's Inventory of US Greenhouse Gas Emissions and Sinks (EPA 2019d). Reported 2018 emissions for all generators by county are as follows:

- McKinley, 1.65 MMT CO₂e
- Rio Arriba, 0.51 MMT CO₂e
- Sandoval, 0.16 MMT CO₂e
- San Juan, 16.22 MMT CO₂e

The BLM New Mexico State Office tracks oil and gas-related development in the FFO. **Table 3-8** shows estimated annual GHG emissions associated with historical well completions that were calculated using a per well emission factor of 1,229 metric tons of CO₂e per year, as reported in the Cumulative BLM New Mexico Greenhouse Gas Emissions Supplemental White Paper (BLM 2019).

Table 3-8
Historical Oil and Gas Well Completions and Estimated GHG Emissions in the FFO

Number of Well Completions	2014	2015	2016	2017	2018
Farmington Field Office	94	71	15	30	33
Metric tons of CO ₂ e per year	115,603	87,317	18,447	36,895	40,584

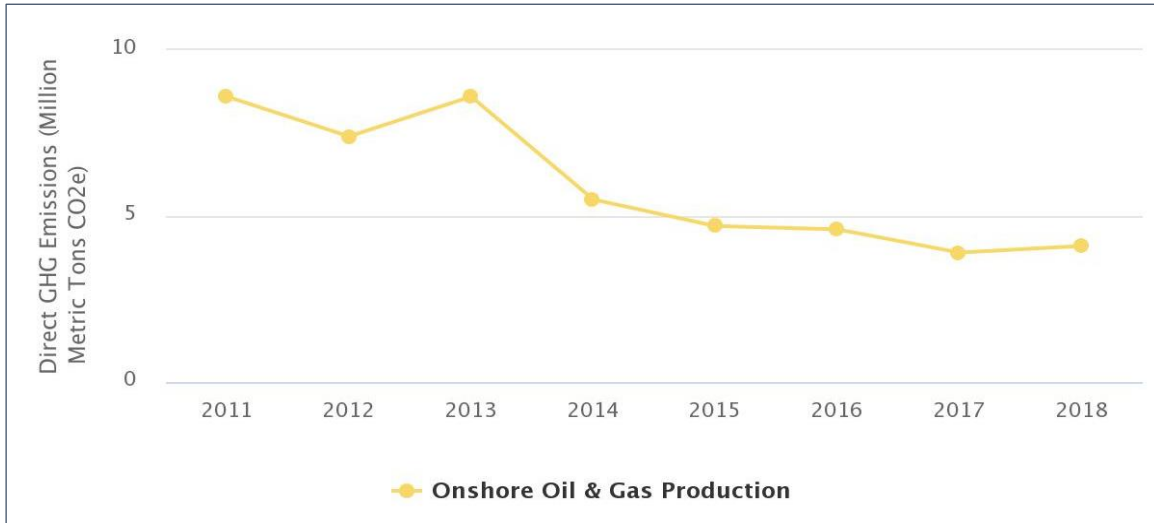
Source: BLM 2019

Methane is a GHG pollutant of concern in the planning area. In 2014, satellite imaging identified high methane concentrations over the Four Corners region, including the northern portion of the planning area. The imaging identified elevated methane concentration levels but not the sources of the methane. Methane is emitted during oil and gas well completions and from process equipment, such as pneumatic controllers and liquid unloading at oil and gas production sites, though other sources of methane may contribute to the methane hotspot. More information on the Four Corners methane hotspot may be found in the Air Resources Technical Report for Oil and Gas Development (BLM 2018c), which the BLM New Mexico State Office updates annually. Information on methane may also be found in a new interactive mapping tool launched by New Mexico in 2019. This tool shows methane hotspot information and information on methane permits.

The mapping tool shows elevated methane levels along the northern border of San Juan County and the western border of Rio Arriba County, New Mexico, and along the southern borders of Montezuma County and La Plata County, Colorado. It also provides locations of NMED-permitted oil and gas wells and tank batteries for permits greater than 10 tons of methane emissions per year. These sources are concentrated along State Route 550 in San Juan, Rio Arriba, and Sandoval Counties, northeast of CCNHP (NMED 2019).

According to the EPA’s FLIGHT database, methane emissions from oil and gas production in the San Juan Basin declined 47 percent between 2011 and 2018 (**Figure 3-4**, San Juan Basin Methane Emissions, 2011–2018), including a decline every year since 2014 (EPA 2019e). This tool only includes emissions information from facilities emitting more than 25,000 metric tons of GHG annually; smaller emitters are not required to report GHG emissions to the EPA.

Figure 3-4
San Juan Basin Methane Emissions, 2011–2018

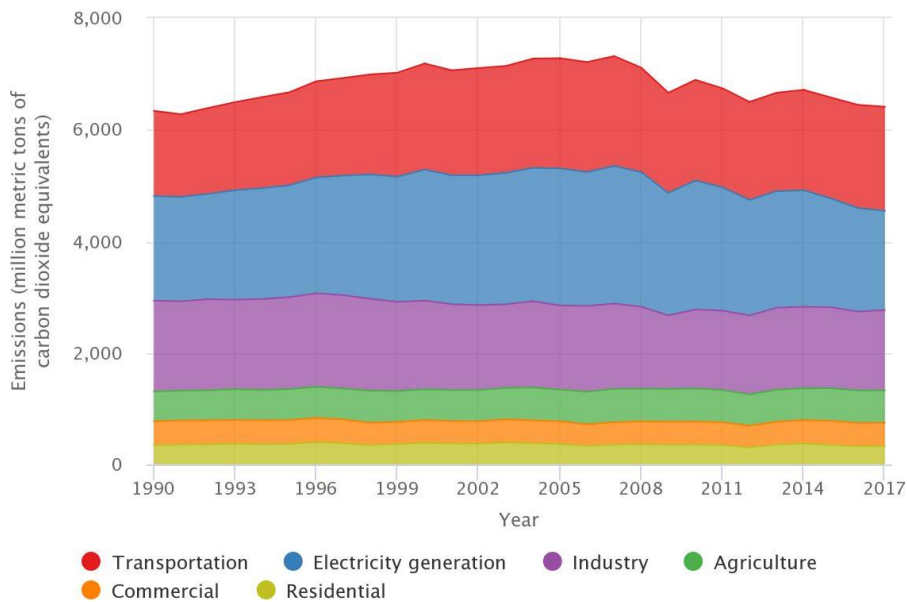


Source: EPA 2019e

Trends

The most recent GHG emission inventory prepared by the EPA (2019d) shows GHG emissions data for 1990 to 2017 by economic section (**Figure 3-5, US GHG Emissions by Economic Sector, 1990–2017**). Emissions were slightly higher in 2017 than in 1990 but were lower than the peak in 2007.

Figure 3-5
US GHG Emissions by Economic Sector, 1990–2017



Source: EPA 2019d

While unavailable by county, the trend in GHG emissions for the fossil fuel industry (production, processing, and transportation of natural gas, oil, and coal) in New Mexico may be indicative of the planning area. As shown in the New Mexico GHG trends report (NMED 2016), GHG emissions from this sector decreased

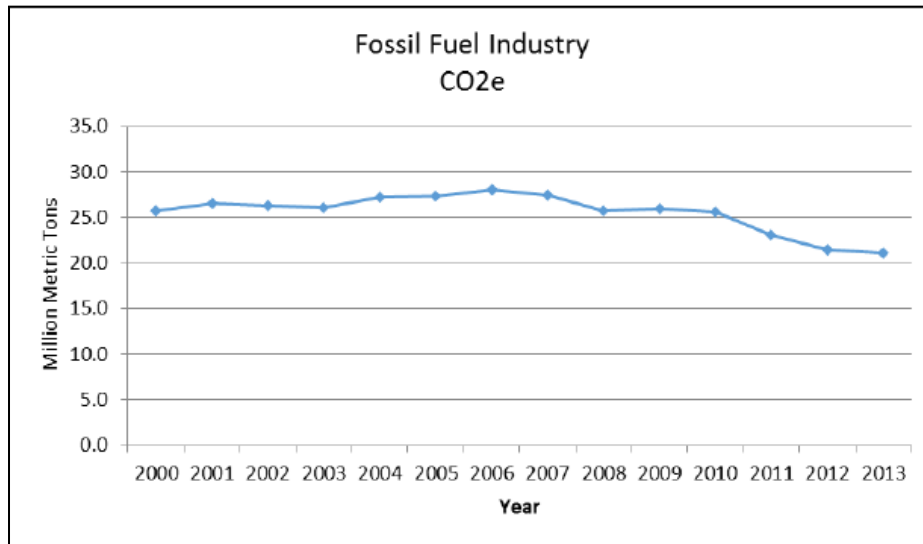
from 2000 to 2013 (**Figure 3-6**, Fossil Fuel Industry CO₂e, New Mexico). However, the New Mexico Greenhouse Gas Inventory and Reference Case Projection 1990-2020 projects GHG emissions of 101.7 MMT CO₂e in 2020, an increase of 48 percent relative to 1990 and 23 percent relative to 2000 (BLM 2019).

The US Energy Information Agency's Annual Energy Outlook 2018 report (EIA 2018) predicts that, based on current regulations, energy-related CO₂ emissions from the industrial sector would grow 0.6 percent annually between 2017 and 2020. Electric power sector emissions would remain flat, commercial sector emissions would grow 0.1 percent annually, and natural gas emissions would grow 0.8 percent annually. It also states the following:

- In the near term, the cumulative effect of increased coal plant retirements, lower natural gas prices, and lower electricity demand would be a reduction in CO₂ emissions from electric generators, even without the Clean Power Plan.
- By 2030, when most of the additional coal unit retirements will have occurred and in the absence of the Clean Power Plan, CO₂ emissions from electric generators would stabilize.

In the planning area, scheduled changes in operations at the San Juan Generating Station and Four Corners Power Plant, described under *Air Quality Trends* above, would result in a localized decrease in GHG emissions from these sources, as reflected in the discussion above.

Figure 3-6
Fossil Fuel Industry CO₂e, New Mexico



Source: NMED 2016

Environmental Consequences

The methods used to assess air quality impacts and the outcomes of the analysis are presented in the Environmental Consequences Supplemental Report, Section EC.4.1, Air Resources. The analysis of fluid minerals-related impacts is based on the CARMMS with Updated Mancos Shale Modeling (CARMMS 2.0; Vijayaraghavan et al. 2017). The BLM undertook CARMMS to estimate the regional and cumulative impacts on air quality and AQRVs from BLM-authorized oil and gas and mining development in the BLM Colorado Field Offices and in the BLM New Mexico FFO. CARMMS analyzed a low development scenario and a high development scenario; it also analyzed a medium scenario, where additional emissions controls were applied to the high scenario.

Because a new RFD for the FMG RMPA/EIS (**Appendix I**) was prepared after the CARMMS 2.0 modeling study was completed, a comparison of well development levels in CARMMS 2.0 and in the RFD was

performed to determine how the projected development in the RFD correlated to the low and high development scenarios in CARMMS 2.0. Table EC-1 in the Environmental Consequences Supplemental Report shows the comparison of the well development levels in the RFD against the CARMMS 2.0 low and high scenarios.

CARMMS 2.0 predicts that under the low scenario, 749 more federal wells would be developed by 2025 than predicted by the RFD baseline scenario (well counts under each alternative are less than the RFD baseline scenario). Thus, the low scenario can be used to represent a conservative estimate of impacts on air resources through 2025 under all alternatives. CARMMS 2.0 predicts that under the high scenario 266 more federal wells would be developed by 2037 than predicted by the RFD baseline scenario. Thus, the high scenario can be used to represent a conservative estimate of impacts on air resources over the life of the RMPA (through 2037) under all alternatives, though with much less certainty. This is because it is speculative to accurately predict future air quality impacts past 2025, since there is no adequate nationwide emissions inventory beyond year 2025 for conducting the cumulative air quality analysis. As air pollutant monitoring data and new future year emissions inventories become available, the BLM is committed to modeling air quality impacts over the life of the RMPA through continued updates to the CARMMS modeling study.

Table 3-9 shows the indicator thresholds used for evaluating potential impacts on air quality and AQRVs. In CARMMS, projected oil and gas development for the planning area is made up of multiple hypothetical future oil and gas projects and thus is an approximation of impacts. As such, comparison of CARMMS output measurements to project-level indicators is more appropriate in a project-level analysis; however, it is used here to describe potential impacts from BLM-authorized oil and gas permitting in the decision area (which includes permitting on lands for which the BIA issues leases).

**Table 3-9
Air Quality and AQRV Indicator Thresholds**

NAAQS		
Pollutant (Averaging Time)	NAAQS¹	NAAQS Thresholds²
Ozone (8-hour)	70 ppb	1.0 ppb
PM _{2.5} (24-hour)	35 µg/m ³	1.2 µg/m ³
PM _{2.5} (Annual)	12 µg/m ³	0.2 µg/m ³
PM ₁₀ (24-hour)	150 µg/m ³	5 µg/m ³
NO ₂ (1-hour)	100 ppb	10 ppb
NO ₂ (Annual)	53 ppb	1 ppb
SO ₂ (1-hour)	75 ppb	10 ppb
SO ₂ (3-hour)	0.5 ppm	25 ppb
Prevention of Significant Deterioration³		
Pollutant (Averaging Time)	Class I PSD Increment Thresholds	Class II PSD Increment Thresholds
PM _{2.5} (24-hour)	2 µg/m ³	9 µg/m ³
PM _{2.5} (Annual)	1 µg/m ³	4 µg/m ³
PM ₁₀ (24-hour)	8 µg/m ³	30 µg/m ³
PM ₁₀ (24-hour)	4 µg/m ³	17 µg/m ³
NO ₂ (Annual)	2.5 µg/m ³	25 µg/m ³
SO ₂ (3-hour)	25 µg/m ³	512 µg/m ³
SO ₂ (24-hour)	5 µg/m ³	91 µg/m ³
SO ₂ (Annual)	2 µg/m ³	20 µg/m ³
Visibility Thresholds⁴		
Change in deciviews at each Class I and Class II area		
Number of days with change in deciviews > 0.5 at a Class I or sensitive Class II area		
Number of days with a change in deciviews > 1.0 at a Class I or sensitive Class II area		

Visibility Thresholds⁴	
Change in 20% worst days at a Class I or sensitive Class II area	
Change in 20% best days at a Class I or sensitive Class II area	
Deposition⁵	
Contribution	Thresholds
Deposition analysis threshold for nitrogen or sulfur (FFO contribution)	0.005 kg/ha-yr
Critical Load Value-Nitrogen (Cumulative contribution)	2.3 kg/ha-yr
Critical Load Value-Sulfur (Cumulative contribution)	5.0 kg/ha-yr
Acid Neutralizing Capacity at Sensitive Lakes⁶	
Capacity	Thresholds
Lakes with background levels greater than 25 µeq/L	10% change in ANL
Lakes with background levels equal to or less than 25 µeq/L	1 µeq/L change

Sources: ¹Appendix J, p. 52; ²40 CFR 51.165(b)(2) and EPA 2018a; ³EPA 2018b; ⁴Appendix J, pp. 80, 90; ⁵Appendix J, p. 96; ⁶Appendix J, p. 115

CARMMS-Based Impact Analysis

As described in the Environmental Consequences Supplemental Report, Section EC.4.1, Air Resources, the CARMMS 2.0 low scenario, which represents a conservative estimate of federal impacts through 2025 under all alternatives, does not exceed the indicator thresholds for any of the NAAQS, the prevention of significant deterioration (PSD) Class I or Class II increment thresholds, the sulfur deposition threshold, the change in visibility threshold at any Class I area, or the thresholds for acid neutralizing capacity at sensitive lakes. The low scenario would exceed the indicator threshold for change in visibility at one Class II area, the Aztec Ruins National Monument, and the nitrogen deposition threshold at Mesa Verde National Park, San Pedro Parks Wilderness, Weminuche Wilderness, Aztec Ruins National Monument, Chama River Canyon Wilderness, South San Juan Wilderness, and Cruces Basin Wilderness.

The CARMMS 2.0 high scenario, which represents a conservative estimate of federal impacts over the life of the RMPA (though with much less certainty), would not exceed any of the PSD Class I or Class II increment thresholds, the change in visibility threshold at Class I areas, the sulfur deposition threshold, or the thresholds for acid neutralizing capacity at sensitive lakes. It would exceed the NAAQS indicator thresholds for ozone, annual average PM_{2.5}, and annual average NO₂; the change in visibility threshold at one Class II area, Aztec Ruins National Monument; and the nitrogen deposition threshold at Bandelier Wilderness, Mesa Verde National Park, San Pedro Parks Wilderness, Weminuche Wilderness, Aztec Ruins National Monument, Chama River Canyon Wilderness, Cruces Basin Wilderness, Dome Wilderness, Monte Vista National Wildlife Refuge, South San Juan Wilderness, and Sandia Mountain Wilderness. As described in the Environmental Consequences Supplemental Report, Section EC.4.1, Air Resources, applying the additional control measures described by the medium scenario would mitigate the impacts on all of the NAAQS indicator thresholds and on the nitrogen deposition threshold at Bandelier Wilderness, Dome Wilderness, and Sandia Mountain Wilderness.

Alternatives-Based Analysis

Based on the CARMMS 2.0 analysis described above, the impacts on air resources for indicator thresholds exceeded under the low or high scenarios (NAAQS and nitrogen deposition) were evaluated for each alternative to provide a comparison of potential impacts by alternative. This was done by scaling the proposed oil and gas development based on the BLM and BIA well projections in the RFD, as shown in Table EC-1 in the Environmental Consequences Supplemental Report, against the well development projections used to assess impacts in CARMMS 2.0. The tables show the BLM, BIA, and total federal contributions from projected oil and gas development and are referenced in the BLM- and BIA-specific alternatives analyses that follow.

Emissions Inventory

Emissions for each alternative were derived by scaling the projected well development under each alternative to the projected well development and associated emissions reported in CARMMS 2.0 (see Table EC-1, FMG RMPA/EIS RFD Projections by Alternative and Table EC-2, 2025 New Mexico Mancos Shale Emissions from Well Development [Construction and Operations] in the Supplemental Environmental Consequences Report). Emissions from each alternative are shown below (Table 3-10).

**Table 3-10
Emissions from Well Development (Construction and Operations) by Alternative**

Scenario	Criteria Pollutant Emissions (tons per year)						GHG Emissions (tons per year)			HAP Emissions (tons per year)
	VOC	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	
BLM Alternatives										
No Action	4,347	2,553	1,971	1,246	212	3	460,411	11,090	7	489
Alt. A	3,247	1,907	1,472	931	158	3	343,895	8,283	5	365
Alt. B1	3,254	1,911	1,476	933	159	3	344,632	8,301	5	366
Alt. B2	2,611	1,533	1,184	748	127	2	276,542	6,661	4	294
Alt. C1	4,328	2,542	1,963	1,241	211	3	458,445	11,043	7	487
Alt. C2	4,321	2,538	1,960	1,239	211	3	457,707	11,025	7	486
Alt. C3	4,314	2,534	1,957	1,237	210	3	456,970	11,007	7	485
Alt. C4	4,307	2,530	1,953	1,235	210	3	456,232	10,989	7	484
Alt. C5	4,289	2,519	1,945	1,229	209	3	454,266	10,942	7	482
Alt. C6	4,300	2,526	1,950	1,233	210	3	455,495	10,972	7	483
Alt. D	4,365	2,564	1,980	1,251	213	3	462,378	11,137	7	491
BIA RFD										
RFD	1,184	695	537	339	58	1	125,366	3,020	2	133
Total Federal (BLM and BIA)										
No Action	5,530	3,248	2,508	1,585	270	4	585,777	14,110	9	622
Alt. A	4,430	2,602	2,009	1,270	216	3	469,260	11,303	7	498
Alt. B1	4,437	2,606	2,012	1,272	216	3	469,998	11,321	7	499
Alt. B2	3,794	2,229	1,721	1,088	185	3	401,907	9,681	6	427
Alt. C1	5,512	3,237	2,500	1,580	269	4	583,810	14,062	9	620
Alt. C2	5,505	3,233	2,497	1,578	269	4	583,073	14,045	9	619
Alt. C3	5,498	3,229	2,493	1,576	268	4	582,335	14,027	9	618
Alt. C4	5,491	3,225	2,490	1,574	268	4	581,598	14,009	9	617
Alt. C5	5,472	3,214	2,482	1,569	267	4	579,631	13,962	9	615
Alt. C6	5,484	3,221	2,487	1,572	267	4	580,860	13,991	9	617
Alt. D	5,549	3,259	2,517	1,591	271	4	587,743	14,157	9	624

Source: Emissions scaled from Table EC-2 based on well counts by alternative.

NAAQS

Likewise, the concentrations of criteria pollutants contributed under each alternative were derived by scaling the projected well development under each alternative to the projected well development and associated pollutant concentration contributions modeled in CARMMS 2.0. Table 3-11 provides a comparison of concentrations by alternative to the indicator thresholds described in Table 3-9, Air Quality and AQRV Indicator Thresholds. Shaded cells indicate a value above the threshold. As described under CARMMS-Based Impact Analysis, applying additional controls would reduce the ozone, PM_{2.5}, and NO₂ concentrations to below the associated threshold.

Table 3-12 shows a comparison of nitrogen deposition concentrations by alternative to the indicator threshold described in Table 3-9; shaded cells indicate a value above the threshold.

Table 3-11
Comparison of Pollutant Concentrations to the NAAQS Indicator Threshold

Scenario	8-hr Ozone (ppb)	24-hr PM _{2.5} (µg/m ³)	Annual PM _{2.5} (µg/m ³)	24-hr PM ₁₀ (µg/m ³)	1-hr NO ₂ (ppb)	Annual NO ₂ (ppb)	1-hr SO ₂ (ppb)	3-hr SO ₂ (ppb)
Indicator	1	1.2	0.2	5	10	1	10	25
BLM Alternatives								
No Action	1.2	0.5	0.1	1.8	4.1	1.2	0.1	0.1
Alt. A	0.9	0.4	0.1	1.3	3.0	0.9	0.1	0.1
Alt. B1	0.9	0.4	0.1	1.3	3.1	0.9	0.1	0.1
Alt. B2	0.7	0.3	0.1	1.1	2.4	0.7	0.1	0.1
Alt. C1	1.2	0.5	0.1	1.8	4.1	1.2	0.1	0.1
Alt. C2	1.2	0.5	0.1	1.8	4.1	1.2	0.1	0.1
Alt. C3	1.2	0.5	0.1	1.8	4.0	1.2	0.1	0.1
Alt. C4	1.2	0.5	0.1	1.8	4.0	1.2	0.1	0.1
Alt. C5	1.2	0.5	0.1	1.7	4.0	1.2	0.1	0.1
Alt. C6	1.2	0.5	0.1	1.7	4.0	1.2	0.1	0.1
Alt. D	1.2	0.5	0.1	1.8	4.1	1.2	0.1	0.1
BIA RFD								
RFD	0.3	0.1	0.0	0.5	1.1	0.3	0.0	0.0
Total Federal (BLM and BIA)								
No Action	1.6	0.7	0.2	2.2	5.2	1.6	0.2	0.2
Alt. A	1.2	0.6	0.1	1.8	4.2	1.2	0.1	0.1
Alt. B1	1.2	0.6	0.1	1.8	4.2	1.2	0.1	0.1
Alt. B2	1.1	0.5	0.1	1.5	3.6	1.1	0.1	0.1
Alt. C1	1.6	0.7	0.2	2.2	5.2	1.6	0.2	0.2
Alt. C2	1.5	0.7	0.2	2.2	5.2	1.5	0.2	0.2
Alt. C3	1.5	0.7	0.2	2.2	5.2	1.5	0.2	0.2
Alt. C4	1.5	0.7	0.2	2.2	5.2	1.5	0.2	0.2
Alt. C5	1.5	0.7	0.2	2.2	5.1	1.5	0.2	0.2
Alt. C6	1.5	0.7	0.2	2.2	5.1	1.5	0.2	0.2
Alt. D	1.6	0.7	0.2	2.3	5.2	1.6	0.2	0.2

Table 3-12
Comparison of Nitrogen Deposition (kg/ha-yr) to the Project-Level Data Analysis Threshold at Class I and Sensitive Class II Areas in and Near the Planning Area

Class I or Sensitive Class II Area	Nitrogen Deposition (kg/ha-yr)																					
	No Action		Alt. A		Alt B1		Alt B2		Alt. C1		Alt. C2		Alt. C3		Alt. C4		Alt. C5		Alt. C6		Alt. D	
	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
Indicator	Data analysis threshold of 0.005 kg/ha-yr																					
BLM Alternatives																						
<u>Class I Area</u>																						
Bandelier Wilderness	0.0037	0.0033	0.0050	0.0045	0.0038	0.0034	0.0030	0.0027	0.0039	0.0035	0.0050	0.0045	0.0050	0.0045	0.0050	0.0045	0.0050	0.0044	0.0050	0.0044	0.0050	0.0044
Mesa Verde NP	0.0172	0.0134	0.0234	0.0182	0.0175	0.0136	0.0140	0.0109	0.0182	0.0142	0.0233	0.0181	0.0232	0.0181	0.0232	0.0181	0.0232	0.0180	0.0231	0.0180	0.0231	0.0180
San Pedro Wilderness	0.0060	0.0045	0.0082	0.0061	0.0061	0.0046	0.0049	0.0037	0.0064	0.0048	0.0081	0.0061	0.0081	0.0061	0.0081	0.0061	0.0081	0.0061	0.0081	0.0061	0.0080	0.0060
Weminuche Wilderness	0.0222	0.0109	0.0165	0.0081	0.0166	0.0081	0.0133	0.0065	0.0221	0.0108	0.0220	0.0108	0.0220	0.0108	0.0220	0.0108	0.0219	0.0107	0.0219	0.0108	0.0222	0.0109
<u>Class II Areas¹</u>																						
Aztec Ruins NM	0.0712	0.0694	0.0968	0.0943	0.0724	0.0706	0.0581	0.0567	0.0755	0.0736	0.0964	0.0939	0.0962	0.0938	0.0961	0.0936	0.0959	0.0935	0.0957	0.0933	0.0955	0.0931
Canyon de Chelly NM	0.0007	0.0005	0.0010	0.0007	0.0007	0.0005	0.0006	0.0004	0.0007	0.0005	0.0009	0.0007	0.0009	0.0007	0.0009	0.0007	0.0009	0.0007	0.0009	0.0007	0.0009	0.0007
CCNHP	0.0022	0.0020	0.0030	0.0027	0.0022	0.0020	0.0018	0.0016	0.0023	0.0021	0.0030	0.0027	0.0030	0.0027	0.0030	0.0027	0.0030	0.0027	0.0030	0.0027	0.0030	0.0027
Chama River Canyon Wilderness	0.0181	0.0123	0.0246	0.0167	0.0184	0.0125	0.0148	0.0100	0.0192	0.0130	0.0245	0.0166	0.0245	0.0166	0.0244	0.0166	0.0244	0.0166	0.0243	0.0165	0.0243	0.0165
Cruces Basin Wilderness	0.0137	0.0117	0.0186	0.0159	0.0139	0.0119	0.0112	0.0096	0.0145	0.0124	0.0185	0.0158	0.0185	0.0158	0.0185	0.0158	0.0185	0.0158	0.0184	0.0157	0.0184	0.0157
Dome Wilderness	0.0033	0.0031	0.0045	0.0042	0.0034	0.0032	0.0027	0.0025	0.0035	0.0033	0.0045	0.0042	0.0045	0.0042	0.0045	0.0042	0.0044	0.0042	0.0044	0.0042	0.0044	0.0042
El Malpais NM	0.0008	0.0005	0.0011	0.0007	0.0008	0.0005	0.0007	0.0004	0.0008	0.0005	0.0011	0.0007	0.0011	0.0007	0.0011	0.0007	0.0011	0.0007	0.0011	0.0007	0.0011	0.0007
Monte Vista NWR	0.0049	0.0040	0.0067	0.0054	0.0050	0.0041	0.0040	0.0033	0.0052	0.0042	0.0066	0.0054	0.0066	0.0054	0.0066	0.0054	0.0066	0.0054	0.0066	0.0054	0.0066	0.0054
Petroglyph NM	0.0018	0.0017	0.0024	0.0023	0.0018	0.0017	0.0015	0.0014	0.0019	0.0018	0.0024	0.0023	0.0024	0.0023	0.0024	0.0023	0.0024	0.0023	0.0024	0.0023	0.0024	0.0023
Sandia Mountain Wilderness	0.0031	0.0022	0.0042	0.0030	0.0032	0.0022	0.0025	0.0018	0.0033	0.0023	0.0042	0.0030	0.0042	0.0030	0.0042	0.0030	0.0042	0.0030	0.0042	0.0030	0.0042	0.0030
S. San Juan Wilderness	0.0244	0.0173	0.0255	0.0180	0.0244	0.0173	0.0196	0.0139	0.0324	0.0230	0.0324	0.0229	0.0323	0.0229	0.0322	0.0228	0.0328	0.0232	0.0323	0.0229	0.0244	0.0173
BIA RFD																						
<u>Class I Area</u>																						
Bandelier Wilderness	0.0014	0.0012	0.0014	0.0012	0.0014	0.0012	0.0014	0.0012	0.0014	0.0012	0.0014	0.0012	0.0014	0.0012	0.0014	0.0012	0.0014	0.0012	0.0014	0.0012	0.0014	0.0012
Mesa Verde NP	0.0064	0.0050	0.0064	0.0050	0.0064	0.0050	0.0064	0.0050	0.0064	0.0050	0.0064	0.0050	0.0064	0.0050	0.0064	0.0050	0.0064	0.0050	0.0064	0.0050	0.0064	0.0050
San Pedro Wilderness	0.0022	0.0017	0.0022	0.0017	0.0022	0.0017	0.0022	0.0017	0.0022	0.0017	0.0022	0.0017	0.0022	0.0017	0.0022	0.0017	0.0022	0.0017	0.0022	0.0017	0.0022	0.0017
Weminuche Wilderness	0.0060	0.0030	0.0060	0.0030	0.0060	0.0030	0.0060	0.0030	0.0060	0.0030	0.0060	0.0030	0.0060	0.0030	0.0060	0.0030	0.0060	0.0030	0.0060	0.0030	0.0060	0.0030
<u>Class II Areas¹</u>																						
Aztec Ruins NM	0.0264	0.0257	0.0264	0.0257	0.0264	0.0257	0.0264	0.0257	0.0264	0.0257	0.0264	0.0257	0.0264	0.0257	0.0264	0.0257	0.0264	0.0257	0.0264	0.0257	0.0264	0.0257
Canyon de Chelly NM	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002
CCNHP	0.0008	0.0007	0.0008	0.0007	0.0008	0.0007	0.0008	0.0007	0.0008	0.0007	0.0008	0.0007	0.0008	0.0007	0.0008	0.0007	0.0008	0.0007	0.0008	0.0007	0.0008	0.0007
Chama River Canyon Wilderness	0.0067	0.0046	0.0067	0.0046	0.0067	0.0046	0.0067	0.0046	0.0067	0.0046	0.0067	0.0046	0.0067	0.0046	0.0067	0.0046	0.0067	0.0046	0.0067	0.0046	0.0067	0.0046
Cruces Basin Wilderness	0.0051	0.0043	0.0051	0.0043	0.0051	0.0043	0.0051	0.0043	0.0051	0.0043	0.0051	0.0043	0.0051	0.0043	0.0051	0.0043	0.0051	0.0043	0.0051	0.0043	0.0051	0.0043
Dome Wilderness	0.0012	0.0011	0.0012	0.0011	0.0012	0.0011	0.0012	0.0011	0.0012	0.0011	0.0012	0.0011	0.0012	0.0011	0.0012	0.0011	0.0012	0.0011	0.0012	0.0011	0.0012	0.0011
El Malpais NM	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002
Monte Vista NWR	0.0018	0.0015	0.0018	0.0015	0.0018	0.0015	0.0018	0.0015	0.0018	0.0015	0.0018	0.0015	0.0018	0.0015	0.0018	0.0015	0.0018	0.0015	0.0018	0.0015	0.0018	0.0015
Petroglyph NM	0.0007	0.0006	0.0007	0.0006	0.0007	0.0006	0.0007	0.0006	0.0007	0.0006	0.0007	0.0006	0.0007	0.0006	0.0007	0.0006	0.0007	0.0006	0.0007	0.0006	0.0007	0.0006
Sandia Mountain Wilderness	0.0011	0.0008	0.0011	0.0008	0.0011	0.0008	0.0011	0.0008	0.0011	0.0008	0.0011	0.0008	0.0011	0.0008	0.0011	0.0008	0.0011	0.0008	0.0011	0.0008	0.0011	0.0008
S. San Juan Wilderness	0.0089	0.0063	0.0089	0.0063	0.0089	0.0063	0.0089	0.0063	0.0089	0.0063	0.0089	0.0063	0.0089	0.0063	0.0089	0.0063	0.0089	0.0063	0.0089	0.0063	0.0089	0.0063

Class I or Sensitive Class II Area	Nitrogen Deposition (kg/ha-yr)																					
	No Action		Alt. A		Alt B1		Alt B2		Alt. C1		Alt. C2		Alt. C3		Alt. C4		Alt. C5		Alt. C6		Alt. D	
	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
Total Federal (BLM and BIA)																						
Class I Area																						
Bandelier Wilderness	0.0064	0.0057	0.0051	0.0046	0.0051	0.0046	0.0044	0.0039	0.0064	0.0057	0.0064	0.0057	0.0064	0.0057	0.0064	0.0057	0.0063	0.0056	0.0063	0.0057	0.0064	0.0057
Mesa Verde NP	0.0297	0.0232	0.0238	0.0186	0.0239	0.0186	0.0204	0.0159	0.0296	0.0231	0.0296	0.0231	0.0296	0.0230	0.0295	0.0230	0.0294	0.0229	0.0295	0.0230	0.0298	0.0233
San Pedro Wilderness	0.0104	0.0078	0.0083	0.0062	0.0083	0.0062	0.0071	0.0053	0.0103	0.0078	0.0103	0.0077	0.0103	0.0077	0.0103	0.0077	0.0103	0.0077	0.0103	0.0077	0.0104	0.0078
Weminuche Wilderness	0.0282	0.0138	0.0226	0.0111	0.0226	0.0111	0.0193	0.0095	0.0281	0.0138	0.0281	0.0138	0.0280	0.0138	0.0280	0.0137	0.0279	0.0137	0.0280	0.0137	0.0283	0.0139
Class II Areas¹																						
Aztec Ruins NM	0.1231	0.1200	0.0986	0.0961	0.0988	0.0963	0.0845	0.0823	0.1227	0.1196	0.1226	0.1195	0.1224	0.1193	0.1222	0.1192	0.1218	0.1188	0.1221	0.1190	0.1235	0.1204
Canyon de Chelly NM	0.0012	0.0009	0.0010	0.0007	0.0010	0.0007	0.0008	0.0006	0.0012	0.0009	0.0012	0.0009	0.0012	0.0009	0.0012	0.0009	0.0012	0.0009	0.0012	0.0009	0.0012	0.0009
CCNHP	0.0038	0.0035	0.0030	0.0028	0.0031	0.0028	0.0026	0.0024	0.0038	0.0034	0.0038	0.0034	0.0038	0.0034	0.0038	0.0034	0.0038	0.0034	0.0038	0.0034	0.0038	0.0035
Chama River Canyon Wilderness	0.0313	0.0213	0.0251	0.0170	0.0251	0.0171	0.0215	0.0146	0.0312	0.0212	0.0312	0.0212	0.0311	0.0211	0.0311	0.0211	0.0310	0.0210	0.0310	0.0211	0.0314	0.0213
Cruces Basin Wilderness	0.0237	0.0202	0.0190	0.0162	0.0190	0.0162	0.0163	0.0139	0.0236	0.0202	0.0236	0.0201	0.0236	0.0201	0.0235	0.0201	0.0234	0.0200	0.0235	0.0201	0.0238	0.0203
Dome Wilderness	0.0057	0.0054	0.0046	0.0043	0.0046	0.0043	0.0039	0.0037	0.0057	0.0053	0.0057	0.0053	0.0057	0.0053	0.0057	0.0053	0.0056	0.0053	0.0057	0.0053	0.0057	0.0054
El Malpais NM	0.0014	0.0009	0.0011	0.0007	0.0011	0.0007	0.0009	0.0006	0.0014	0.0009	0.0014	0.0009	0.0014	0.0009	0.0014	0.0009	0.0014	0.0009	0.0014	0.0009	0.0014	0.0009
Monte Vista NWR	0.0085	0.0069	0.0068	0.0055	0.0068	0.0056	0.0058	0.0047	0.0084	0.0069	0.0084	0.0069	0.0084	0.0069	0.0084	0.0069	0.0084	0.0068	0.0084	0.0069	0.0085	0.0069
Petroglyph NM	0.0031	0.0029	0.0025	0.0024	0.0025	0.0024	0.0021	0.0020	0.0031	0.0029	0.0031	0.0029	0.0031	0.0029	0.0031	0.0029	0.0031	0.0029	0.0031	0.0029	0.0031	0.0029
Sandia Mountain Wilderness	0.0054	0.0038	0.0043	0.0030	0.0043	0.0031	0.0037	0.0026	0.0053	0.0038	0.0053	0.0038	0.0053	0.0038	0.0053	0.0038	0.0053	0.0038	0.0053	0.0038	0.0054	0.0038
S. San Juan Wilderness	0.0415	0.0294	0.0332	0.0236	0.0333	0.0236	0.0285	0.0202	0.0414	0.0293	0.0413	0.0293	0.0413	0.0292	0.0412	0.0292	0.0411	0.0291	0.0412	0.0292	0.0416	0.0295

¹Air quality and AQRVs in sensitive Class II areas are not regulated under the Clean Air Act.

BLM Alternatives

Impacts Common to All Alternatives

Under all alternatives, the BLM's actions and use authorizations will comply with all applicable local, state, Tribal, and federal air quality laws, statutes, regulations, standards, and implementation plans. For any proposed action associated with the RMP, including increases in current extraction or use, the BLM will coordinate with all appropriate agencies of state, federal, and Tribal governments to ensure compliance with laws and regulations.

Based on the CARMMS 2.0 analysis, concentrations from federal oil and gas activity in the FFO would be below the PSD increment thresholds, the sulfur deposition thresholds, and the ANC thresholds at all Class I and sensitive Class II areas under all modeled scenarios; therefore, federal oil and gas activity would not affect Class I or Class II areas for these indicator thresholds under any of the alternatives.

Based on the CARMMS 2.0 analysis, federal oil and gas activity in the FFO has the potential to affect visibility at the Aztec Ruins National Monument under all modeled scenarios; therefore, BLM-authorized oil and gas wells could affect visibility at this location under all alternatives.

Under all alternatives, BMPs and COAs to reduce air resource impacts could be applied on approval of an APD, based on the analysis performed at that time.

Implementing RMPA management actions for lands and realty, vegetation, and lands with wilderness characteristics would have no discernable impact on air resources under all alternatives. This is because these actions would not result in long-term changes in air quality compared with the current conditions described under *Affected Environment*; therefore, these topics are not discussed in detail.

BLM No Action Alternative

Under this alternative, the total level of BLM-permitted well development over the life of the RMPA (see Table EC-1) would be approximately 36 percent higher than the low scenario modeled in CARMMS 2.0, and it would be 32 percent lower than the high scenario. Based on **Table 3-11**, BLM-authorized oil and gas wells under the No Action Alternative could exceed the indicators for the 8-hour ozone, annual PM_{2.5}, and annual NO₂ NAAQS. Applying the additional control measures described by the medium scenario (see **Appendix J, Table 2-2**) would mitigate the impacts on all of the NAAQS SILs.

As shown in **Table 3-12**, federal oil and gas activity in the FFO could affect nitrogen deposition levels at four Class I areas and seven sensitive Class II areas; however, the deposition analysis threshold is a project-level threshold that is more appropriate for analyzing specific proposed projects rather than this planning-level analysis.

BLM Alternative A

Under this alternative, there would be an approximately 25 percent decrease in BLM-permitted well development, compared with the BLM No Action Alternative (see Table EC-1). Since air emissions from well development correlate to the number of wells developed, Alternative A generally would have a 25 percent reduction in air emissions from well development, compared with the BLM No Action Alternative. Because surface disturbance would be slightly reduced (2 percent reduction), impacts from fugitive dust emissions would be slightly less than under the BLM No Action Alternative.

Based on **Table 3-11**, BLM-authorized oil and gas wells under BLM Alternative A could exceed the indicators for the 8-hour ozone and annual NO₂ NAAQS. Applying the additional control measures described by the medium scenario (see **Appendix J, Table 2-2**) would mitigate the impacts on all of the NAAQS SILs.

As shown in **Table 3-12**, federal oil and gas activity in the FFO could affect nitrogen deposition levels at four Class I areas and six sensitive Class II areas; however, the deposition analysis threshold is a project-level

threshold that is more appropriate for analyzing specific proposed projects rather than this planning-level analysis.

BLM Alternative B (Includes BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

BLM Sub-Alternative B1

Under this alternative, there would be an approximately 25 percent decrease in BLM-permitted well development, compared with the BLM No Action Alternative (see **Table EC-1**). Since air emissions from well development correlate to the number of wells developed, BLM Sub-Alternative B1 generally would have a 25 percent reduction in air emissions from well development, compared with the BLM No Action Alternative. Because surface disturbance would be reduced by 2 percent, compared with the BLM No Action Alternative, impacts from fugitive dust emissions would be only slightly less.

Based on **Table 3-11**, BLM-authorized oil and gas wells under BLM Sub-Alternative B1 would have the potential to exceed the indicators for the 8-hour ozone and annual NO₂ NAAQS. Applying the additional control measures described by the medium scenario (see **Appendix J, Table 2-2**) would mitigate the impacts on all of the NAAQS SILs.

As shown in **Table 3-12**, federal oil and gas activity in the FFO could affect nitrogen deposition levels at four Class I areas and five sensitive Class II areas; however, the deposition analysis threshold is a project-level threshold that is more appropriate for analyzing specific proposed projects rather than this planning-level analysis.

BLM Sub-Alternative B2

Under this alternative, there would be an approximately 40 percent decrease in BLM-permitted well development, compared with the BLM No Action Alternative (see **Table EC-1**). Since air emissions from well development correlate to the number of wells developed, BLM Sub-Alternative B2 generally would have a 40 percent reduction in air emissions from well development, compared with the BLM No Action Alternative. Because surface disturbance would be reduced by 3 percent, compared with the BLM No Action Alternative, impacts from fugitive dust emissions would be slightly less.

Based on **Table 3-11**, BLM-authorized oil and gas wells under BLM Sub-Alternative B2 would have the potential to exceed the indicators for the 8-hour ozone and annual NO₂ NAAQS. Applying the additional control measures described by the medium scenario (see **Appendix J, Table 2-2**) would mitigate the impacts on all of the NAAQS SILs.

As shown in **Table 3-12**, federal oil and gas activity in the FFO could affect nitrogen deposition levels at three Class I areas and five sensitive Class II areas; however, the deposition analysis threshold is a project-level threshold that is more appropriate for analyzing specific proposed projects rather than this planning-level analysis.

BLM Alternative C (Including BLM Sub-Alternatives C1 to C6; applying only to Fluid Minerals)

There would be a 1 percent to less than 1 percent decrease in BLM-permitted well development under all sub-alternatives compared with the BLM No Action Alternative (see **Table EC-1**). Since air emissions from well development correlate to the number of wells developed, the BLM Alternative C sub-alternatives would have a 1 percent or less reduction in air emissions from well development, compared with the BLM No Action Alternative. Because surface disturbance would be almost the same under all sub-alternatives (less than 1 percent decrease), impacts from fugitive dust emissions would be similar to the BLM No Action Alternative.

Based on **Table 3-11**, BLM-authorized oil and gas wells under all of the BLM Alternative C sub-alternatives could exceed the indicators for the 8-hour ozone, annual PM_{2.5}, and annual NO₂ NAAQS. Applying the additional control measures described by the medium scenario (see **Appendix J, Table 2-2**) would mitigate the impacts on all of the NAAQS SILs.

As shown in **Table 3-12**, federal oil and gas activity in the FFO could affect nitrogen deposition levels at four Class I areas and seven sensitive Class II areas under all Alternative C sub-alternatives; however, the deposition analysis threshold is a project-level threshold that is more appropriate for analyzing specific proposed projects rather than this planning-level analysis.

BLM Alternative D

Under this alternative, there would be a less than 1 percent increase in BLM-permitted well development, compared with the BLM No Action Alternative (see **Table EC-1**). Since air emissions from well development correlate to the number of wells developed, BLM Alternative D generally would have a less than 1 percent increase in air emissions from well development, compared with the BLM No Action Alternative. Impacts from fugitive dust emissions would be similar to the BLM No Action Alternative.

Based on **Table 3-11**, BLM-authorized oil and gas wells under BLM Alternative D would have the potential to exceed the indicators for the 8-hour ozone, annual PM_{2.5}, and annual NO₂ NAAQS. Applying the additional control measures described by the medium scenario (see **Appendix J, Table 2-2**) would mitigate the impacts on all of the NAAQS SILs.

As shown in **Table 3-12**, federal oil and gas activity in the FFO could affect nitrogen deposition levels at four Class I areas and seven sensitive Class II areas; however, the deposition analysis threshold is a project-level threshold that is more appropriate for analyzing specific proposed projects rather than this planning-level analysis.

BIA Alternatives

This section discusses impacts on air resources from proposed BIA management actions. Because the BLM is responsible for permitting well development on lands for which the BIA issues leases, impacts on air resources from oil and gas development on Navajo Tribal trust and individual Indian allotted lands were included in the *BLM Alternatives* discussion of impacts; however, they are also discussed in this section to describe the relative contribution of impacts on air resources. Well counts and surface disturbance levels would be the same across all BIA alternatives.

Impacts Common to All Alternatives

Under all BIA alternatives, fluid mineral leasing would have no direct impacts on air quality and AQRVs. Indirect impacts from subsequent oil and gas development would occur under all alternatives. Because the BLM is responsible for authorizing APDs on lands for which the BIA is responsible for authorizing leases, impacts on air quality and AQRVs from fluid mineral development would be as described in *BLM Alternatives*; however, a summary of impacts from the incremental contribution of the additional wells on Navajo Tribal trust and individual Indian allotted lands (see **Table EC-1**) are as follows:

- The individual Indian allotted and Navajo Tribal trust contribution to the NAAQS pollutant concentrations would be below the SILs for all criteria pollutants (**Table 3-11**).
- The individual Indian allotted and Navajo Tribal trust contribution to nitrogen deposition would exceed the SIL for Mesa Verde National Park, Aztec Ruins National Monument, Chama River Canyon Wilderness, Cruces Basin Wilderness, and South San Juan Wilderness. As described previously, the deposition analysis threshold is a project-level threshold and is more appropriate for analyzing specific proposed projects than this planning-level analysis.

None of the BIA fluid minerals actions detailed in **Table 2-4** specifically address air quality. As described for the BLM APD stage, the BIA may attach COAs to APDs at the time of APD approval, and the BLM would then attach them to any APDs. These COAs could reduce air quality impacts at the site-specific scale, depending on the COAs attached.

Fluid minerals management actions that have the potential to reduce overall surface disturbance on Navajo Tribal trust and individual Indian allotted lands would indirectly affect air quality by reducing sources of fugitive dust. These potential effects are described by alternative.

The alternatives contain one action that specifies a minimum distance from any structure on a home site, house, or community, municipal, or public structure. Oil and gas drilling could not occur within this distance. This action would minimize potential health-related impacts from air pollutant emissions and is described in **Section 3.7.4, Public Health and Safety, BIA Alternatives.**

BIA No Action Alternative

Under current management, the BIA would continue to comply with all applicable federal, state, and Tribal air quality laws, rules, and regulations. It would continue to have no stipulations with respect to infrastructure placement to minimize surface disturbance; however, the lessees would continue to submit NEPA compliance documentation to ensure that the surface, natural resources, environment, and existing improvements are properly protected.

This NEPA analysis would assist the BIA in continuing to apply stipulations and COAs that the proposed surface disturbance operations would be subject to. This would maintain or minimize impacts on air quality before surface-disturbing activities begin on individual Indian allotment lands.

BIA Alternative A

Roads, utilities, and pipelines may share common ROWs to minimize surface disturbance. Collocating infrastructure would minimize surface disturbances and associated impacts on air quality and AQRVs from fugitive dust more than under the BIA No Action Alternative.

Before leasing or surface-disturbing activities, FIMO would complete NEPA compliance documentation for the entire leased area. On completion of the analysis, the FIMO director would notify the lessee of the stipulations and the conditions that the proposed surface-disturbing operations would be subject to, based on NEPA-required mitigation. This would maintain or minimize impacts on air resources before surface-disturbing activities begin on individual Indian allotment lands, similar to the BIA No Action Alternative.

BIA Alternative B

Roads, utilities, and pipelines may share common ROWs to minimize surface disturbance, and directional drilling may be required, where practical, to collocate wells to reduce road, well pad, and utility surface disturbance. Collocating infrastructure would minimize surface disturbances and associated impacts on air quality and AQRVs from fugitive dust more than under the BIA No Action Alternative.

The minimization of impacts on air quality from NEPA compliance documentation would be the same as described under BIA Alternative A.

BIA Alternative C

Impacts from collocating infrastructure and requiring directional drilling would be the same as described under BIA Alternative B. The minimization of impacts on air quality from NEPA compliance documentation would be the same as described under BIA Alternative A.

BIA Alternative D

Impacts from collocating infrastructure would be similar to those described under BIA Alternative A. Accommodating the needs of the landowner may lead to more or less surface disturbance and associated impacts than the BIA No Action Alternative, depending on what those needs are.

The minimization of impacts on air quality from NEPA compliance documentation would be the same as described under BIA Alternative A.

Air Resources Protection Practices

Under all alternatives, the BLM FFO will follow a process to minimize impacts on air quality when authorizing oil and gas-related activities in the Mancos-Gallo portion of the FFO. The FMG RMPA/EIS will provide the overarching framework for evaluating future oil and gas leasing and development actions in the Mancos-Gallup decision area. This includes the BMPs (**Appendix B**), COAs (**Appendix C**), and stipulations (**Appendix D**) that will be applied at each stage of leasing and development. This would be determined by site-specific NEPA analysis, federal and state permitting requirements, and federal, state, Tribal, and local rules and regulations in place at the time to reduce the impacts on air quality and AQRVs from oil and gas development and production.

Appropriate air resources protection requires the BLM to manage its authorized activities and actions at broad spatial and temporal scales, which are dynamic and thus subject to change. The BLM will accomplish this over the life of the RMPA through regular review and adjustment of management approaches during the authorization of emissions-generating activities, commensurate with changing circumstances.

The BLM New Mexico State Office uses an adaptive management strategy to track BLM-authorized oil and gas development in the planning area and assess air quality annually, the results of which are documented in an annual report. The BLM may take one or more of the following actions to ensure an adequate analysis and to guide subsequent protection of air quality resources in the FFO:

- **Monitoring**—Ambient air monitoring provides valuable data for determining current and background concentrations of air pollutants. The BLM will report and document results of ambient air quality monitoring (concentration data) in the planning area in its annual air report. Additionally, the BLM will continue to cooperate with industry and other entities to establish, operate, and maintain a comprehensive air monitoring network. The BLM may request proponents of projects with the potential to generate substantial air emissions to submit pre-construction air monitoring data from a site in the proposed development area where air quality monitoring data are not currently represented and where the project has the potential to generate substantial air emissions. The BLM also may request that air monitoring for the life of the project be conducted, based on the availability of representative air monitoring data. Finally, the BLM may use project-specific monitoring data in subsequent NEPA analyses required for project approvals.
- **Emissions Inventories**—The BLM may request proponents of projects with the potential to generate substantial air emissions to verify that project emission inventories will not exceed estimated emission inventories that the BLM submits as part of the NEPA process. If the project emissions are in exceedance of the estimated emissions inventory that the BLM presents during the NEPA process, the BLM will request the proponent of an oil and gas development to submit a comprehensive inventory of anticipated direct and indirect emissions associated with a proposed project. The BLM will review the emissions inventory to determine its completeness and accuracy.
- **Modeling**—The BLM will use regional air modeling and project-specific modeling, in conjunction with other air analysis tools, to develop air resource protection strategies. Modeling also may be required for areas where there is potential to degrade one or more NAAQS or other thresholds. Further, the BLM will provide appropriate disclosure for any modeling of direct, indirect, and cumulative impacts of proposed actions during required NEPA analysis.
- **Permitting**—The BLM will require, as appropriate, any federal, state, Tribal, county, or local permits. As part of the NEPA process and before the authorization of any federal mineral development, the BLM will conduct an appropriate level of air analysis to determine the potential impacts on air quality, based on the estimated emissions from the activity being authorized.
- **Mitigation**—Many activities that the BLM authorizes, permits, or allows generate air pollutant emissions that could adversely affect air resources. The primary mechanism to reduce impacts on air resources is to reduce emissions via project design and mitigation. The BLM will ensure implementation of reasonable mitigation, control measures, and design features through appropriate

mechanisms, including lease stipulations, notices to lessees, and COAs, as provided for by law and consistent with lease rights and obligations. Based on future CARMMS modeling iterations, mitigation may take the form of one or more of the source controls modeled by the medium scenario to further reduce air pollutant emissions (see **Table 2-2** in **Appendix J**).

Cumulative Effects

Air Quality

Cumulative air quality impacts occur when multiple sectors of an all-inclusive emissions inventory affect the same geographic areas at the same time or when sequential projects extend the duration of air quality impacts on a given area over a longer period. The CARMMS 2.0 study modeled air quality under 2011 base case conditions and projected air quality under 2025 future conditions from federal and nonfederal oil and gas development, as well as from non-oil and gas emission sources, such as biogenic (natural) emissions, electric generating units, fires, and mobile sources. In most cases, the modeling showed a decrease in criteria pollutant concentrations, an improvement in visibility, and a decrease in deposition rates between 2011 and 2025, which matches the trends discussion in the *Affected Environment* section, above. **Appendix J** describes the CARMMS 2.0 base and future modeling results for the FFO in detail.

Climate Change and Greenhouse Gases

Currently there are no feasible and reliable tools to predict the impacts that GHG emissions from an individual project or group of projects would have on global, regional, or local climate, nor are there currently any regulatory thresholds of significance against which to measure GHG emission levels.

Obtaining an accurate picture of GHG emissions from projected oil and gas development requires an analysis of the full life-cycle potential of these resources. Climate change impacts are not attributable to any single action; however, they are exacerbated by a multitude of actions, which can include those taken under decisions of the federal government. For this reason, this analysis includes a discussion of GHG emissions associated with the extraction of resources (well construction and operations), as well as GHG emissions from combustion of oil and gas resources extracted from federal lands (production, or downstream/end-use emissions).

Well Development (Construction and Operations) GHG Emissions. Projected annual GHG emissions (CO₂, CH₄, and N₂O) from well development (construction and operations) by alternative were shown in **Table 3-10**. These emissions were converted to carbon dioxide equivalents (CO_{2e}) in **Table 3-13** and compared with state, national, and global GHG emission levels.

Production (Downstream/End-Use) GHG Emissions. GHG emissions from production are generated by a product or service when they are used and disposed of by the consumer. Land use plan or allocation decisions are so far removed from end-use consumption of energy products from federal lands that it makes this information not as useful in informing land use plan, or allocation, decisions. The challenge in estimating production emissions comes with understanding production levels anticipated from particular leases or wells and how oil and gas will be distributed and used for energy. It can be reasonably assumed that the oil and gas produced in the FFO will be combusted for energy consumption and use. End uses of hydrocarbons eventually extracted from the FFO could include the combustion of transportation fuels, fuel oils for heating and electricity generation, the production of asphalt and road oil, and the manufacturing of chemicals, plastics, and other synthetic materials. Because this information is not typically available during the planning stage, the BLM can only provide an estimate of potential GHG emissions using national approximations of where or how the end use may occur. Therefore, the BLM uses an alternate method of estimating GHG emissions from production, based on production data, to provide a general sense for land use planning purposes.

**Table 3-13
Greenhouse Gas Emissions from Federal Well Development (Construction and Operations) by Alternative**

Scenario	Total Annual CO ₂ e (MMt)	% NM Emissions	% US Emissions	% Global Emissions
BLM Alternatives				
No Action Alternative	0.74	0.73	0.011	0.0016
Alternative A	0.55	0.54	0.009	0.0012
Alternative B1	0.55	0.54	0.009	0.0012
Alternative B2	0.44	0.44	0.007	0.0010
Alternative C1	0.74	0.72	0.011	0.0016
Alternative C2	0.74	0.72	0.011	0.0016
Alternative C3	0.73	0.72	0.011	0.0016
Alternative C4	0.73	0.72	0.011	0.0016
Alternative C5	0.73	0.72	0.011	0.0016
Alternative C6	0.73	0.72	0.011	0.0016
Alternative D	0.74	0.73	0.012	0.0016
BIA RFD				
All Alternatives	0.20	0.20	0.003	0.0004
Total Federal (BLM and BIA)				
No Action Alternative	0.94	0.93	0.015	0.0021
Alternative A	0.75	0.74	0.012	0.0016
Alternative B1	0.76	0.74	0.012	0.0017
Alternative B2	0.65	0.63	0.010	0.0014
Alternative C1	0.94	0.92	0.015	0.0021
Alternative C2	0.94	0.92	0.015	0.0020
Alternative C3	0.94	0.92	0.014	0.0020
Alternative C4	0.93	0.92	0.014	0.0020
Alternative C5	0.93	0.92	0.014	0.0020
Alternative C6	0.93	0.92	0.014	0.0020
Alternative D	0.94	0.93	0.015	0.0021

Source: EMPSi staff conversion of GHG emissions in **Table 3-10** to carbon dioxide equivalents (CO₂e), using global warming potentials (GWPs) for the 100-year time horizon of 25 for CH₄ and 298 for N₂O. Each GHG has a GWP that accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere. GWP values allow for a comparison of the impacts of emissions and reductions of different gases. According to the IPCC, GWPs typically have an uncertainty of ±35 percent. GWPs have been developed for several GHGs over different time horizons including 20 years, 100 years, and 500 years. The choice of emission metric and time horizon depends on the type of application and policy context; hence, no single metric is optimal for all policy goals. The 100-year GWP was adopted by the United Nations Framework Convention on Climate Change and its Kyoto Protocol and is now used widely as the default metric. In addition, the EPA uses the 100-year time horizon in its Inventory of US Greenhouse Gas Emissions and Sinks: 1990–2016 (April 2018), GHG Reporting Rule requirements under 40 CFR Part 98 Subpart A, and uses the GWPs and time horizon consistent with the IPCC Fifth Assessment Report, Climate Change Synthesis Report, 2014 in its science communications. In this EIS, the BLM uses GWPs and the 100-year time horizon consistent with EPA. Percentage comparisons are based on New Mexico 2020 projected emissions of 101.7 MMT CO₂e (BLM 2019); US 2017 emissions of 6,457 MMT/CO₂e (EPA 2019d), and global 2014 emissions of 45,741 MMT CO₂e (WRI 2019a); while the value used for state, US, or global emissions may vary by source, the differences do not change the order of magnitude of comparison.

The calculation of production emissions in this analysis is based on information about the likely resource production, based on the RFD (**Appendix I**). To estimate the end-use energy consumption emissions for the planning area, the projected oil and gas production amounts under each alternative were multiplied by appropriate emission factors to calculate CO₂ emissions. These emissions are presented in **Table 3-14**. The total emissions represent the total production-related GHG emissions over the life of the RMP, while the average emissions represent the average annual emissions (total emissions divided by 20 years). The production emissions by year of the RMP for each alternative are included at the end of **Appendix J**.

Table 3-14
Total and Average Production (Downstream/End-Use) GHG Emissions from
Federal Oil and Gas Production by Alternative

Scenario		Wells	Annual Oil Production (bbl)	Downstream Emissions—Oil (MMt CO _{2e})	Annual Gas Production (mcf)	Downstream Emissions—Gas (MMt CO _{2e})	Total Oil and Gas Emissions (MMt CO _{2e})
Federal Wells in the Planning Area (non-BIA)							
No Action	Total	1,873	179,281,000	77.09	2,930,738,000	161.48	238.57
	Ave.	94	8,964,050	3.85	146,536,900	8.07	11.93
Alt. A	Total	1,399	142,504,000	61.28	2,416,476,000	133.15	194.42
	Ave.	70	7,125,200	3.06	120,823,800	6.66	9.72
Alt. B1	Total	1,402	140,124,000	60.25	2,441,627,000	134.53	194.79
	Ave.	70	7,006,200	3.01	122,081,350	6.73	9.74
Alt. B2	Total	1,125	112,895,000	48.54	2,189,249,000	120.63	169.17
	Ave.	56	5,644,750	2.43	109,462,450	6.03	8.46
Alt. C1	Total	1,865	178,816,000	76.89	2,920,719,000	160.93	237.82
	Ave.	93	8,940,800	3.84	146,035,950	8.05	11.89
Alt. C2	Total	1,862	178,692,000	76.84	2,916,574,000	160.70	237.54
	Ave.	93	8,934,600	3.84	145,828,700	8.04	11.88
Alt. C3	Total	1,860	178,658,000	76.82	2,911,646,000	160.43	237.25
	Ave.	93	8,932,900	3.84	145,582,300	8.02	11.86
Alt. C4	Total	1,856	178,438,000	76.73	2,908,282,000	160.25	236.97
	Ave.	93	8,921,900	3.84	145,414,100	8.01	11.85
Alt. C5	Total	1,848	178,069,000	76.57	2,897,482,000	159.65	236.22
	Ave.	92	8,903,450	3.83	144,874,100	7.98	11.81
Alt. C6	Total	1,853	178,311,000	76.67	2,904,134,000	160.02	236.69
	Ave.	93	8,915,550	3.83	145,206,700	8.00	11.83
Alt. D	Total	1,881	179,836,000	77.33	2,939,977,000	161.99	239.32
	Ave.	94	8,991,800	3.87	146,998,850	8.10	11.97
BIA Wells in the Planning Area							
	Total	510	44,559,125	19.16	811,343,953	44.71	63.87
	Ave.	26	2,227,956	0.96	40,567,198	2.24	3.19
Total Federal (BLM and BIA)							
No Action	Total	2,383	223,840,125	96.25	3,742,081,953	206.19	302.44
	Ave.	119	11,192,006	4.81	187,104,098	10.31	15.12
Alt. A	Total	1,909	144,731,956	80.44	3,227,819,953	177.85	258.29
	Ave.	95	7,125,200	4.02	161,390,998	8.89	12.91
Alt. B1	Total	1,912	142,351,956	79.41	3,252,970,953	179.24	258.65
	Ave.	96	7,006,200	3.97	162,648,548	8.96	12.93
Alt. B2	Total	1,635	115,122,956	67.71	3,000,592,953	165.33	233.04
	Ave.	82	5,644,750	3.39	150,029,648	8.27	11.65

Scenario	Wells	Annual Oil Production (bbl)	Downstream Emissions—Oil (MMt CO _{2e})	Annual Gas Production (mcf)	Downstream Emissions—Gas (MMt CO _{2e})	Total Oil and Gas Emissions (MMt CO _{2e})
Alt. C1	Total	2,375	181,043,956	96.05	3,732,062,953	301.69
	Ave.	119	8,940,800	4.80	186,603,148	15.08
Alt. C2	Total	2,372	180,919,956	96.00	3,727,917,953	301.41
	Ave.	119	8,934,600	4.80	186,395,898	15.07
Alt. C3	Total	2,370	180,885,956	95.98	3,722,989,953	301.12
	Ave.	119	8,932,900	4.80	186,149,498	15.06
Alt. C4	Total	2,366	180,665,956	95.89	3,719,625,953	300.84
	Ave.	118	8,921,900	4.79	185,981,298	15.04
Alt. C5	Total	2,358	180,296,956	95.73	3,708,825,953	300.09
	Ave.	118	8,903,450	4.79	185,441,298	15.00
Alt. C6	Total	2,363	180,538,956	95.83	3,715,477,953	300.56
	Ave.	118	8,915,550	4.79	185,773,898	15.03
Alt. D	Total	2,391	182,063,956	96.49	3,751,320,953	303.19
	Ave.	120	8,991,800	4.82	187,566,048	15.16

Source: EMPSi Staff calculations, based on RFD oil and gas production numbers (**Appendix I**)

Bbl = barrels, mcf = thousand cubic feet, MMt = million metric tons

Emissions from oil combustion based on an emission factor of 0.43 metric tons CO₂ per barrel; gas combustion based on an emission factor of 0.0551 metric tons CO₂ per mcf (<https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>)

Total Federal GHG Emissions. Annual GHG emissions from federal (BLM and BIA) well development and production by alternative are shown in **Table 3-15** (annual emissions from well development plus average annual production emissions). Midstream emissions (e.g., gas gathering/boosting compressor stations, gas processing plants) are assumed to be negligible; Mancos Shale gas gathering and boosting requirements are assumed to be met by existing infrastructure inside or in close proximity to the Mancos Shale development area (**Appendix J**). It should be noted that the comparison of development and production GHG emissions to New Mexico GHG emissions assumes all oil and gas produced in the FFO is combusted within the state. This represents an overly conservative comparison if produced oil and gas is combusted outside of New Mexico.

**Table 3-15
Total Average Annual GHG Emissions from Federal Oil and Gas Development and Production by Alternative**

Scenario	Emissions (MMt CO _{2e} /year)			% NM Emissions	% US Emissions	% Global Emissions
	Well Development	Production (Downstream /End-Use)	Total			
Federal Wells in the Planning Area (non-BIA)						
No Action	0.74	11.93	12.67	12.46	0.20	0.03
Alt. A	0.55	9.72	10.27	10.10	0.16	0.02
Alt. B1	0.55	9.74	10.29	10.12	0.16	0.02
Alt. B2	0.44	8.46	8.90	8.76	0.14	0.02
Alt. C1	0.74	11.89	12.63	12.42	0.20	0.03
Alt. C2	0.74	11.88	12.62	12.40	0.20	0.03
Alt. C3	0.73	11.86	12.59	12.38	0.20	0.03
Alt. C4	0.73	11.85	12.58	12.37	0.19	0.03
Alt. C5	0.73	11.81	12.54	12.33	0.19	0.03

Scenario	Emissions (MMt CO _{2e} /year)			% NM Emissions	% US Emissions	% Global Emissions
	Well Development	Production (Downstream /End-Use)	Total			
Alt. C6	0.73	11.83	12.56	12.35	0.19	0.03
Alt. D	0.74	11.90	12.64	12.43	0.20	0.03
BIA Wells in the Planning Area						
All Alts	0.20	3.19	3.39	3.33	0.05	0.01
Total Federal (BLM and BIA)						
No Action	0.94	15.12	16.06	15.79	0.25	0.04
Alt. A	0.75	12.91	13.66	13.44	0.21	0.03
Alt. B1	0.76	12.93	13.69	13.46	0.21	0.03
Alt. B2	0.65	11.65	12.30	12.09	0.19	0.03
Alt. C1	0.94	15.08	16.02	15.75	0.25	0.04
Alt. C2	0.94	15.07	16.01	15.74	0.25	0.03
Alt. C3	0.94	15.05	15.99	15.72	0.25	0.03
Alt. C4	0.93	15.04	15.97	15.71	0.25	0.03
Alt. C5	0.93	15.00	15.93	15.66	0.25	0.03
Alt. C6	0.93	15.02	15.95	15.69	0.25	0.03
Alt. D	0.94	15.16	16.10	15.84	0.253	0.04

Source: Derived from data contained in **Table 3-13** and **Appendix J, Tables J-1** through **J-13**

Percentage comparisons are based on New Mexico 2020 projected emissions of 101.7 MMT CO_{2e} (BLM 2019); US 2017 emissions of 6,457 MMT/CO_{2e} (EPA 2019d), and global 2014 emissions of 45,741 MMT CO_{2e} (WRI 2019a); while the value used for state, US, or global emissions may vary by source, the differences do not change the order of magnitude of comparison.

Cumulative (Federal and Nonfederal) GHG Emissions. Past and present planning area, state, national, and global GHG emissions and trends were described under *Affected Environment*.

Reasonably foreseeable future actions are described in the BLM’s Cumulative BLM New Mexico Greenhouse Gas Emissions Supplemental White Paper (BLM 2019). This report describes production (downstream/end-use) CO_{2e} emissions from all well development (federal, Tribal, state, and fee minerals) in the planning area (see also **Table J-1** in **Appendix J**). Cumulative emissions during the 20-year period under the baseline RFD scenario are estimated to produce approximately 400 MMT of CO_{2e} from the end-use combustion of products from 3,200 wells. Annual CO_{2e} emissions would range from approximately 15 MMT/year in 2024 to 29 MMT/year in 2037 under this scenario. Cumulative production (downstream/end-use) emissions by alternative for all wells in the planning area are presented in **Tables J-2** to **J-13** in **Appendix J**.

Potential effects from cumulative GHG emissions would contribute to documented ongoing and reasonably foreseeable climate-related effects, including long-term global temperature change, intensified droughts impacting agricultural, rural, and urban communities and resulting in changes in land cover and land use; intensified and more frequent wildfires; sea level rise, ocean warming, and reduced ocean oxygen, impacting global weather patterns and flora and fauna; intensified flooding impacting infrastructure, natural resource-based livelihoods, and cultural resources; and human health, such as heat-associated deaths and illnesses, chronic diseases, and other health issues associated with poor air quality (Gonzalez et al. 2018).

3.4.2 Geology

Affected Environment

Current conditions for geologic resources throughout the planning area, including the BLM and BIA decision areas, are shown in **Figures I-5, I-7, and Figure AE-6**. The planning area is in the San Juan Basin, which is an asymmetrical syncline in the Colorado Plateau, extending from northwestern New Mexico into southwestern Colorado. The basin is about 200 miles long and 130 miles wide, covering approximately 21,600 square miles.

The predominant hydrocarbon reservoirs of the San Juan Basin are all Cretaceous, including the Fruitland Formation, Pictured Cliffs Sandstone, Mesaverde Group, Mancos Shale Formation, Gallup Sandstone, and Dakota Sandstone. These formations contain both source rocks and natural reservoirs for oil and gas. Oil plays and mineral resources are further discussed under **Section 3.5.2, Minerals**. There are two formations with unique geologic significance in the planning area: Angel Peak and Beechatuda Tongue. The BLM manages them as SDAs to protect them from surface and subsurface disturbance. Geologic formations may also have cultural significance, as described in **Sections 3.4.9, Cultural Resources**, and **3.7.1, Native American Tribal Interests and Uses**.

Traditional users gather certain minerals, such as iron pyrite, for use in their cultural practices. One Navajo belief is that Earth is the mother of the Navajo people and that its degradation, including hydraulic fracturing and oil and gas extraction from geologic formations, will also harm the Navajo people. Additionally, degradation of Earth is believed to reduce the power of traditional ceremonies, especially ceremonies that directly address the geology of Earth, such as the Red Ant Way (Begay 2001). See **Section 3.7.1, Native American Tribal Uses and Interests**, for more information.

Trends

Angel Peak and the Beechatuda Tongue stratigraphic unit are expected to continue normal erosion patterns and to continue to be sites of interest to the public. Angel Peak is expected to continue to draw visitors as a recreation opportunity; the Beechatuda Tongue stratigraphic unit is expected to continue to receive visitors of the scientific community for comparison values to other nearby stratigraphic units.

Seismic Activity

There have been no major earthquakes in or near the planning area. The planning area is under extensional deformation (Zoback 1989), or a “stretching” pressure on the rock. Extensional deformation produces a much slower energy buildup than compressional deformation, or a “squeezing” pressure on the rock; accordingly, earthquakes are less likely to occur and, when they do occur, are of a low intensity. Thus, in the planning area, the earthquake peak ground acceleration with a 2 percent chance of being exceeded in 50 years is of such a small value (USGS 2014) that an observer in the planning area would likely not feel any ground movement.

Environmental Consequences

BLM Alternatives

Impacts Common to All BLM Alternatives

Details on the nature and types of impacts on geology across all the BLM alternatives are provided in the Environmental Consequences Supplemental Report, Section EC.2.2, Geology.

Vegetation Management and Lands with Wilderness Characteristics

Under all the BLM alternatives, vegetation treatments could affect geologic resources through increased surface disturbance and increased access to the resources. These impacts, however, would be mitigated by application of vegetation management actions described in **Table 2-2**, such as consultation with Tribes and the public to identify any CIMPPs, which may include geologic resources for mineral gathering, prior to vegetation management. In the long term, vegetation treatments would reduce erosion and sedimentation, thereby reducing impacts on soils and in turn geologic resources. Treatments resulting in more natural and healthy vegetation communities also may increase stability of soils and protect geologic resources.

Management of lands with wilderness characteristics would not independently contribute to impacts on geologic resources. Restrictions on fluid mineral and ROW development in lands managed to protect wilderness characteristics as a priority over other multiple uses are included in the overall discussion of impacts from fluid minerals and lands and realty management under each alternative. For these reasons, vegetation and lands with wilderness characteristics management are not discussed further in this section.

Fluid Minerals

Under all the BLM alternatives, surface occupancy would be prohibited in Beechatuda Tongue, thereby protecting its unique geologic feature.

The Angel Peak ACEC is open to fluid mineral leasing; however, all 248 acres would have an NSO stipulation in place under all alternatives. Applying an NSO stipulation within the Angel Peak ACEC would prevent impacts from oil and gas development on geologic features. There are numerous existing wells in the Angel Peak ACEC. These wells were permitted prior to the 2003 RMP that implemented the NSO stipulation. These existing wells could cause impacts on the setting of this unique geologic feature should an accident occur, such as a fire or spill.

Locations proposed for drilling would be examined for CIMPPs as part of Section 106 consultation, which would seek to minimize impacts on these resources. This would provide some protection for traditional mineral gathering areas and other culturally significant geologic features (**Section 3.4.9**, Cultural Resources). Without knowing the locations of mineral gathering, impacts on specific locations cannot be analyzed at the planning level, and there would be further analysis at the site-specific, APD level. Oil and gas development would continue, which would result in impacts related to the Navajo traditional beliefs about the Earth described under *Affected Environment*.

According to the 2019 RFD, management under the No Action Alternative and Alternative D would result in the greatest levels of development (**Appendix I**). No risk of induced seismicity is expected because the San Juan Basin is geologically stable. All estimates of surface disturbance below are for disturbance from oil and gas development on BLM-managed federal mineral estate over the next 20 years.

BLM No Action Alternative

Fluid Minerals and Lands and Realty

Under the BLM No Action Alternative, areas would remain open to fluid mineral leasing (see **Table 2-1**, Comparative Summary of BLM Alternatives [Acres]), and additional surface disturbance from oil and gas development in the BLM mineral decision area would continue to occur (see **Table 3-1**, RFD Projections by Alternative). ROW management would continue on a case-by-case basis under the BLM No Action Alternative. Surface disturbing activities from oil and gas development and ROW construction would allow for continued potential for damage to traditional mineral gathering areas and culturally significant geologic formations in areas that are disturbed.

BLM Alternative A

Fluid Minerals and Lands and Realty

There would be an approximately 10 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 28,800 acres (2 percent) of the BLM surface decision area as ROW exclusion, 1,060,400 acres (81 percent) as ROW avoidance, 397,900 acres as closed to leasing, and 682,300 acres of the BLM surface decision area as NSO would reduce surface disturbance in those areas. These measures would, in turn, reduce the potential for damage to traditional mineral gathering areas, compared with the BLM No Action Alternative.

BLM Alternative B (Includes BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

Lands and Realty

Managing 24,800 acres (2 percent) of the BLM surface decision area as ROW exclusion, 956,100 acres (73 percent) as ROW avoidance would reduce surface disturbance in those areas. These measures would reduce the potential for damage to traditional mineral gathering areas, compared with the BLM No Action Alternative.

Fluid Minerals

BLM Sub-Alternative B1

Under BLM Sub-Alternative B1, when compared with the No Action Alternative, there would be a 16 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 426,500 acres of BLM surface decision area as NSO, and 494,700 acres of BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for damage to traditional mineral gathering areas, when compared with the BLM No Action Alternative.

BLM Sub-Alternative B2

Under BLM Sub-Alternative B2, when compared with the No Action Alternative, there would be a 9 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 398,100 acres of BLM surface decision area as NSO, and 571,300 acres of BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for damage to traditional mineral gathering areas, when compared with the BLM No Action Alternative.

BLM Alternative C (Includes BLM Sub-Alternatives C1 to C6; applying only to Fluid Minerals)

Lands and Realty

Under BLM Alternative C, managing 2,800 acres (less than 1 percent) of the BLM surface decision area as ROW exclusion and 5,900 acres (less than 1 percent) as ROW avoidance would reduce surface disturbance in those areas. These measures would reduce the potential for damage to traditional mineral gathering areas, compared with the BLM No Action Alternative.

Fluid Minerals

BLM Sub-Alternative C1

Under this sub-alternative, there would be a less than 1 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 81,800 acres of the BLM surface decision area as NSO and 96,300 acres of the BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for damage to traditional mineral gathering areas, compared with the BLM No Action Alternative.

BLM Sub-Alternative C2

Under this sub-alternative, there would be a less than 1 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 91,600 acres of the BLM surface decision area as NSO and 96,300 acres of the BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for damage to traditional mineral gathering areas, compared with the BLM No Action Alternative.

BLM Sub-Alternative C3

Under this sub-alternative, there would be a less than 1 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 105,600 acres of the BLM surface decision as NSO and 96,300 acres of the BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for damage to traditional mineral gathering areas, compared with the BLM No Action Alternative.

BLM Sub-Alternative C4

Under this sub-alternative, there would be a less than 1 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 131,500 acres of the BLM surface decision as NSO and 96,300 acres of the BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for damage to traditional mineral gathering areas, compared with the BLM No Action Alternative.

BLM Sub-Alternative C5

Under this sub-alternative, there would be a less than 1 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 168,200 acres of the BLM surface decision area as NSO and 96,300 acres of the BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for damage to traditional mineral gathering areas, compared with the BLM No Action Alternative.

BLM Sub-Alternative C6

Under this sub-alternative, there would be a less than 1 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 92,500 acres of the BLM surface decision area as NSO and 110,300 acres of the BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for damage to traditional mineral gathering areas, compared with the BLM No Action Alternative.

BLM Alternative D

Lands and Realty and Fluid Minerals

Under this alternative, the same level of surface disturbance is projected as under the BLM No Action Alternative. This would in turn result in the same level of potential damage to traditional mineral gathering areas.

However, managing 2,800 acres (less than 1 percent) of the BLM surface decision area as ROW exclusion, 5,900 acres (less than 1 percent) as ROW avoidance, and 96,300 acres of the BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas, as compared with the BLM No Action Alternative. This may, to a small degree, reduce the potential for damage to traditional mineral gathering areas. Managing 38,000 acres of the BLM surface decision area as NSO would represent a reduction in NSO protections compared with the No Action Alternative.

BIA Alternatives

Impacts Common to All BIA Alternatives

Under all BIA alternatives, additional surface disturbance from oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative. There are no currently mapped geologically significant areas in the BIA surface or mineral decision area. Under all BIA alternatives, locations proposed for drilling would be examined for CIMPPs as part of Section 106 consultation. This would seek to minimize impacts on these properties, including any culturally significant geologic formations. It would also provide some protection for traditional mineral gathering areas. Without knowing the locations of mineral gathering or proposed well sites, impacts on specific locations cannot be analyzed at the planning level; there would be further analysis at the site-specific level. See **Section 3.4.9**, Cultural Resources, for a further discussion of the impacts on cultural resources by alternative.

BIA No Action Alternative

The BIA would continue to limit surface disturbances associated with new roads and facilities. This could limit the risk of impacts on traditional mineral gathering areas and culturally significant geologic formations.

BIA Alternative A

Compared with the BIA No Action Alternative, reclaiming portions of disturbed areas not needed for production, operations, transportation, or safety in fluid mineral leases or ROWs, and applying larger setbacks from structures and water bodies could contribute to reduced levels of surface disturbance in localized areas. This could result in less potential for damage to traditional mineral gathering areas and culturally significant geologic formations.

BIA Alternative B

BIA management affecting surface disturbance and the impacts of that management on geologic resources would be similar to that under BIA Alternative A. The exception is that requiring directional drilling and collocation of facilities could further reduce surface disturbance in localized areas, compared with the BIA No Action Alternative. This could result in less potential for damage to traditional mineral gathering areas and culturally significant geologic formations.

BIA Alternative C

BIA management affecting surface disturbance and the impacts of that management on geologic resources would be the same as those under BIA Alternative B.

BIA Alternative D

Compared with the BIA No Action Alternative, reclaiming portions of disturbed areas not needed for production, operations, transportation, or safety purposes in fluid mineral leases or ROWs could contribute to reduced surface disturbance in localized areas under Alternative D. This could result in less potential for damage to traditional mineral gathering areas and culturally significant geologic formations compared with the BIA No Action Alternative.

Cumulative Impacts

Analysis of the cumulative impacts on geology encompasses the entire planning area. Past, present, and reasonably foreseeable future actions and conditions in the area that have affected and will likely continue to affect geology are those that would disturb the surface. Examples include the construction or expansion of well pads, access roads, and pipelines on lands with private minerals. Under all BIA and BLM alternatives, oil and gas development in the planning area would continue to affect geologic resources. Alternatives that reduce overall surface disturbance would reduce the cumulative impacts on geology in the planning area.

BLM and BIA management under Alternatives A, B, and C would lower the levels of surface disturbance in the planning area, compared with the BLM and BIA No Action Alternatives; therefore, they would contribute less to cumulative impacts on geology (see **Table 3-1**, RFD Projections by Alternative). Management under both agencies' No Action Alternative and Alternative D would contribute the most to cumulative impacts on geology in the planning area. Under all BLM and BIA alternatives, additional surface disturbance from oil and gas development is expected to cover less than 0.01 percent of the planning area; therefore, the cumulative contribution of BLM and BIA management to impacts on traditional mineral gathering areas and culturally significant geologic formations would be minimal.

3.4.3 Water Resources

Affected Environment

Water resources in the planning area are surface waters and groundwater. Surface waters are lakes, ponds, rivers, and springs; groundwater is all water below the ground surface. Surface water features throughout the planning area, including the BLM and BIA decision areas, are shown in **Figure 3-7**, Surface Water. Groundwater exists in the pore spaces of unconsolidated materials, such as alluvial sediments that fill river valleys; however, it is also in consolidated materials, such as sandstone and shale.

The water information in this section is applicable to both BLM- and BIA-managed lands. When available, information specific to the BLM or BIA is also identified and is labeled throughout this section. Any Indian

trust assets (ITAs) involving water resources are discussed under **Section 3.7.1**, Native American Tribal Interests and Uses. For additional discussion on riparian areas and wetlands, see **Section 3.4.4**.

Information included in this section is based on the impacts on water quantity and quality disclosed in the 2019 BLM New Mexico Water Support Document (WSD) included as an attachment to the RFD in **Appendix I**. The WSD relies on information from the 2015 USGS report, Estimated Use of Water in the United States in 2015 (Dieter et al. 2018), and FracFocus, a national hydraulic fracturing chemical registry managed by the Ground Water Protection Council and Interstate Oil and Gas Compact Commission. The BLM also interviewed the San Juan Basin’s active operators to gain a better understanding regarding slick water techniques to update the slick water information within the WSD.

Current Conditions

Water Supply

The planning area contains nine watersheds, organized as fourth-level hydrologic unit codes (HUCs; see **Table 3-16**; NHD GIS 2016). In the planning area, there are approximately 7,800 miles of perennial, intermittent, and ephemeral streams on BLM-managed lands and 3,600 miles on Navajo Tribal trust lands and individual Indian allotments (NHD GIS 2016).

**Table 3-16
BLM and BIA Surface Decision Area Watersheds**

Watershed	Acres
Animas	102,200
Arroyo Chico	43,900
Blanco Canyon	594,700
Chaco Wash	904,700
Mancos	400
Middle San Juan	245,900
Rio Chama	40,200
Rio Puerco	14,500
Upper San Juan	654,600
Total	2,601,200

The principal perennial surface waters in the planning area are the San Juan River, the Animas River, the La Plata River, and the Rio Grande (see **Table 3-16**). Major tributaries that rise in the southern portion of the San Juan Basin are Canyon Largo, Gallegos Canyon, and Chaco Wash, all of which are ephemeral streams.

There are ten major confined aquifers in the San Juan Basin, as listed in the Affected Environment Supplemental Report, Section AE.2.3, Water Resources.

The New Mexico Bureau of Geology and Mineral Resources (NMBGMR) study, the Hydrologic Assessment of Oil and Gas Resource Development of the Mancos Shale in the San Juan Basin New Mexico (2014), summarizes the availability of groundwater in the state, including the availability for groundwater for oil and gas development in the San Juan Basin. This study concluded that the total water rights that have been permitted in the San Juan Basin are around 107,000 acre-feet per year (afy). The coal and uranium mining industries currently hold 31.1 percent (33,098 afy) of the water rights in the San Juan Basin, compared with the 6.3 percent (6,674 afy) owned by the petroleum industry (NMBGMR 2014). As of 2019, a number of oil and gas companies have applied for water rights in the San Juan Basin, with wells to be located in San Juan, Rio Arriba, and Sandoval Counties. These applicants seek 33,820 afy combined from wells that will be drilled at depths ranging from 2,500 to 10,000 feet (NMOSE 2019). Under current conditions, oil and gas producers can legally obtain water resources in a number of ways. The following list represents some, but not all, of these means:

- leasing a valid water right for either surface water or groundwater via a permit from the New Mexico Office of the State Engineer (NMOSE)
- buying or leasing water from a legal water provider (such as a municipality, Pueblo, Tribe, or Nation)
- relying on a private well owner's request for a permit to use their existing private well for prospecting, mining, or public works uses, with certain restrictions applied
- purchasing water from a non-potable reclaimed water supplier; or using produced water or reclaimed wastewater, which can be done without any NMOSE permit, New Mexico Oil Conservation Division (NMOCD) restriction, or NMED limitation or control

Other major water uses are domestic users and municipalities at 28.2 percent and food production at 24.7 percent. The Navajo Nation holds water rights in the San Juan Basin, for irrigation and for municipal, industrial, commercial, and domestic uses (NMOSE/ISC 2017).

Tables 3-1 through 3-4 of the WSD summarize total water withdrawals for the counties comprising the FFO across eight water use categories, while Table 3-5 identifies water use by category for the state of New Mexico (see **Appendix I**). Water use totals for each of these industries are summarized by surface water and groundwater, which is further divided into fresh water (potable) and saline water (non-potable) use for each category.

In Rio Arriba County, where most of the oil and gas development is expected to take place in the FFO, irrigation is the largest category of water use within the field office boundary, accounting for an average of 93 percent (109,129 acre-feet [af]) of the total water withdrawal (118,120 af).

In San Juan County, irrigation accounts for 79 percent (223,942 af) of the total water withdrawal (283,748 af). Mining accounts for 2 percent (6,356 af) of total water withdrawals.

In Sandoval County, mining accounts for 2 percent (1,312 af) of the total water use (71,576 af). All water used by mining activities comes from groundwater. The largest water use categories are irrigation (79 percent), followed by public water supply (8 percent). Most drilling activities are expected to take place in the northwest corner of the county, where there is a much greater development potential for oil and gas than in other areas of the county.

In McKinley County, consumptive water use from mining activities accounts for 17 percent (2,309 af) of the total water use for the county (13,217 af). Because data used in the WSD show water use by county, not by the BLM field office boundary, it is unknown if mining activities accounting for 17 percent of the total water use are entirely within the FFO.

The Navajo Indian Irrigation Project (NIIP) was authorized on June 13, 1962 (Public Law 87-483, as amended by Public Law 91-416 on September 25, 1970) to develop the necessary infrastructure to deliver San Juan River water to not more than 110,630 acres of farmland in the northeastern part of the Navajo Reservation near Farmington, New Mexico (**Figure 3-8**). The water supply is provided by Navajo Lake, the reservoir formed behind Navajo Dam on the San Juan River. The project is entitled to 508,000 af of San Juan River water (Navajo Agricultural Products Industry 2017).

Water Quality

Regulatory Framework

An EPA report on the impacts of hydraulic fracturing on drinking water (EPA 2016b) found that although impacts are slight and improbable, such impacts can still be considered a risk. Potential impacts include water withdrawals for hydraulic fracturing during times of low water availability; spills of chemicals that reach groundwater resources; injection of fluids into groundwater resources; and discharge of fluids into surface water resources (EPA 2016b). The Inspection and Enforcement Department of the BLM and the New Mexico Oil Conservation Division (NMOCD) have created safeguards to prevent such situations from occurring. These agencies' requirements limit the potential for groundwater reservoirs and shallow aquifers

to be affected by hydraulic fracturing or migration of hydrocarbons. The steps taken to avoid such impacts are described in Section 3.2.3 of the WSD (**Appendix I**). These include planning for casing and cementing to protect all usable water zones; performing inspections of oil and gas operations to ensure that there is adequate isolation of subsurface fluids and that all casing meets proper standards; and ensuring that drilling operations do not contaminate fresh water aquifers and other subsurface and surface resources (see the BLM Inspection and Enforcement Handbook, H-3160-5 [2009] and Onshore Oil and Gas Order No. 2).

Under the authority of the Mineral Leasing Act of 1920, as amended, and 43 CFR 3160, the BLM implements other safeguards and regulations for the prevention of harm to the environment, health, and human safety, specifically surface and groundwater resources, as identified below.

- Onshore Oil and Gas Order No. 1: This requires drilling plans to be submitted with APDs. Drilling plans identify geologic information, including estimated depth and thickness of zones potentially containing usable water and the operator's plans for protecting such resources. An approved APD will contain conditions of approval that reflect necessary mitigation measures, such as water quality monitoring projects, deemed appropriate at the site-specific level. In addition, Onshore Order 1 requires a Surface Use Plan of Operations to include a description of safe operations and adequate protection of surface resources, groundwater, and other environmental components.
- Onshore Oil and Gas Order No. 2: This lists regulatory requirements for hydraulic fracturing, including casing specifications, monitoring and recording, and management of recovered fluids.
- 43 CFR 3162.3-3(e)(i): This requires monitoring protocols for the cement casing of an oil or gas well to ensure that it is designed to sufficiently protect and isolate groundwater.
- 43 CFR 3162.5-1: This requires operators to "conduct operations in a manner which protects the mineral resources, other natural resources, and environmental quality." Additionally, this section requires all spills or leakages to be controlled and removed.
- 43 CFR 3162.5-2: This gives the BLM the authority to require an operator to monitor water resources to ensure that the isolation procedures used to protect water and other resources were effective.

In addition to these regulations, the operator must comply with other applicable laws and regulations for ground and surface water protection. The State of New Mexico's regulations for drilling, casing and cementing, completion, and plugging to protect freshwater zones can be found at 19.15.16 NMAC.

In the event of a spill or release of hydraulic fracturing chemicals or fluids, lessees and operators are obligated by the standard terms of the lease, the approved APD, and BLM Notice to Lessees and Operators of Onshore Federal and Indian Oil and Gas Leases NTL-3A (Reporting of Undesirable Events) to report, respond to, and mitigate the spill or release. Site-specific mitigation tools would be developed as appropriate and could include surface or groundwater quality monitoring studies. For example, the BLM could require drilling operators to test water resources before, during, and after operations.

Finally, protection of ground and surface water is enforced in concert with the State of New Mexico and any other applicable entities with jurisdiction (e.g., Tribal entities, the USACE, and the EPA). In addition to the enforcement of the regulations described above, operators would be required to remediate impacts from any contamination events.

Surface Water

BLM

The BLM does not have jurisdiction over water quality or use. Regulations around water quality and use are under the jurisdiction of the State of New Mexico. The New Mexico Clean Water Act, Section 303(d)/Section 305(b) Integrated Report identifies streams that have impaired water quality. Watersheds containing impaired streams are summarized in **Table 3-17**, with miles of 303(d) impaired streams on BLM- and BIA-managed land.

**Table 3-17
Impaired Water Quality by Watershed**

Watershed Name	Miles on BLM-Managed Land	Miles on BIA-Managed Land	Total Miles in the Planning Area
Animas	0.7	0.0	36.6
Middle San Juan	4.3	12.4	48.0
Upper San Juan	6.4	0.0	101.9
Total	11.4	12.4	186.6

Source: NHD GIS 2016

Quality data for the ephemeral runoff south of the San Juan River are limited to only a few observations at sampling stations in the northern part of the FFO. In general, surface water has relatively low concentrations of dissolved solids in its upper reaches, and high concentrations of magnesium, calcium, sodium, and sulfate in its middle and lower reaches; there are also higher concentrations of ions at low-flow conditions (see Section 3.2.2 of the WSD, **Appendix I**). Ephemeral flows are generally of very poor quality, due to the highly erosive and saline nature of the soils, sparse vegetation cover, and rapid runoff conditions that are characteristic of the area. Under State of New Mexico law, potable or freshwater is defined as water with less than 1,000 milligrams per liter (mg/L) of total dissolved solids (TDS). Surface runoff in the area usually contains greater than 10,000 mg/L of suspended sediment and greater than 1,000 mg/L of dissolved solids (BLM 2015b).

BIA

The BIA manages water quality under the Navajo Nation Clean Water Act (NNEPA 2017b). The executive director of the NNEPA promulgates water quality standards that protect the public health and welfare, enhance the quality of water, and generally serve the purposes of the Navajo Nation Clean Water Act.

According to the Clean Water Act, the executive director of the NNEPA may grant or deny any certification, federal license, or permit necessary to conduct any activity. This includes the construction or operation of facilities that could result in a discharge into waters of the Navajo Nation. This depends on whether the applicant has satisfactorily shown a willingness to comply with Sections 301, 302, 303, 306, and 307 of the Clean Water Act (NNEPA 2017b).

In addition, the Navajo Nation Safe Drinking Water Act protects the health and welfare of the Navajo people and the environment. It establishes appropriate standards to ensure that drinking water is safe for consumption. It also protects underground sources of drinking water from potential contamination by underground injection activities.

The Counselor Chapter of the Navajo Nation conducted a health impact assessment to document health concerns expressed by community members and to investigate certain water and air quality conditions in the Counselor-Nageezi area. The water samples taken from public water faucets contained no detectable contaminants at levels violating EPA water quality standards. Total dissolved solids (TDS; over 600 mg/L), sodium, sulfates, and alkalinity levels were all high in the water, but not at levels that make the water unsafe to drink. A livestock pond was also sampled and was found to have lower TDS and alkalinity levels (Counselor Health Impact Assessment Committee 2017). Because the sampling method was not provided, it is difficult to evaluate the conclusions.

Groundwater

The BLM and BIA cooperate with state and local governments to implement the various laws relevant to groundwater pollution control. In addition to the aquifers in the planning area, Tribes have expressed concern about potential degradation of aquifers in the vicinity outside of the planning area.

The quality of groundwater in the San Juan Basin is generally variable, ranging from fair to poor or fresh to brackish. Saline and brackish water is found in the center of the basin in the deepwater bearing zones, while fresh groundwater occurs near the margins, where the formations are closer to the surface (see Figure 3.3

of the WSD, **Appendix I**). In most places, the TDS content exceeds 1,000 mg/L; it can range from 500 to 4,000 mg/L (BLM 2003; USGS 2001). In general, freshwater is found where it is confined at depths less than 2,500 feet below the surface.

Floodplains

A floodplain is a geographic area of relatively level land that is occasionally subject to inundation by surface water from rivers or streams. A 100-year flood, also known as the 1-percent flood, is one that has a 1 percent probability of occurring in any given year. In the planning area, there are 78,700 acres of 100-year floodplain on BLM-managed land and 27,800 acres on BIA-managed land (FEMA GIS 2017).

Trends

Water Supply

Groundwater is expected to continue to be the primary source of municipal, industrial, Tribal, and agricultural water in the planning area. Further, groundwater is currently the only source of water for many of the Navajo Nation Chapters in the planning area. Changing climate patterns could have long-term impacts on stream flows, snowpack, and groundwater recharge. Some of the potential impacts of changes in climate conditions, such as increased frequency of wildfires, increased evaporation, changes in vegetation patterns, increased erosion, and diminished snowpack, may reduce groundwater recharge (BLM 2015b).

Demand for potable groundwater in the San Juan Basin has been increasing and is expected to continue to increase. Groundwater elevations in the aquifers underlying the region have shown declining trends. In 2009, the State of New Mexico reached a final settlement with the Navajo Nation that initiated the Navajo-Gallup Water Supply Project. The project is expected to divert 37,764 afy from the San Juan River, based on an assumed demand rate of 160 gallons per day per person. It also assumes a projected population of 250,000 in the Navajo Nation, the Jicarilla Apache Nation, and the city of Gallup by 2040. The project assumes 1,871 afy of return flows to the San Juan River (BOR 2009).

Similarly, demand for water outside the basin is expected to continue to increase, while supply continues to decrease. In response, the New Mexico State Engineer has imposed limitations on groundwater extraction by adjudicating water rights in the San Juan Basin and other basins in the planning area. Similar trends have occurred in the portions of the San Juan Basin in Arizona, Utah, and Colorado (BLM 2015b).

Hydraulic fracturing requires water and is expected to continue in the planning area. The WSD includes a forecast of the potential quantity of water that would be required for hydraulic fracturing of the wells forecasted under the RFD (see Section 3.1.2 of the WSD, **Appendix I**). The RFD estimates that over the next 20 years (2018 to 2037), drilling and completion of the projected 3,200 wells is expected to occur in the planning area under current management.

Estimated water use may increase dramatically if slickwater hydraulic fracturing technology becomes more commonly used in oil and gas development. Previous hydraulic fracturing techniques relied on other substances like nitrogen, which reduced water use, but still relied on only fresh, nonsaline water. Accordingly, the original RFD projections estimated water use based on these hydraulic fracturing techniques (identified in this section as the “nitrogen scenario”). Under the nitrogen scenario, the RFD baseline estimated that the average water use for vertical wells in the New Mexico portion of the San Juan Basin is 0.537 af per well, while horizontal wells require 3.13 af per well; however, the WSD reanalyzed the amount of water that was used for hydraulic fracturing in 2018 and estimated that horizontal wells require 4.84 af per well (see Table 3-8 of the WSD, **Appendix I**). This translates to up to 11,615 af of water, or 580 af in any given year. This is a maximum scenario, estimating that 100 percent of wells will be hydraulically fractured and not accounting for reuse or recycling of hydraulic fracturing fluid. Water used for hydraulic fracturing of the estimated 3,200 wells in the 2018 RFD is assumed to come primarily from fresh groundwater sources based on historical oil and gas development in the area and from county water use data (see Section 3.1.1 of the WSD, **Appendix I**).

In 2015, operators began completing wells using slickwater fracturing techniques. These techniques use greater quantities of water during the stimulation of the well under development but can use saline or non-potable water. If operators implement the slickwater technology more frequently than occurred in 2018 and prior years, it is expected that total water use volumes on a per well basis will trend upward.

To address this concern, the BLM analyzed data from FracFocus for completed wells and recent APDs using slickwater stimulation, and developed estimates of associated water use for development of the total wells projected in the RFD scenario using slickwater stimulation techniques. The BLM estimates that the amount of water required to completely develop all projected horizontal wells in the Mancos Shale and Gallup Sandstone formations via slickwater stimulation, plus developing all projected vertical wells using nitrogen stimulation (identified here as the “slickwater scenario”), would be approximately 125,000 af, or 6,250 af in any given year (Section 3.1.4 of the WSD, **Appendix I**). This scenario was developed as a maximum reasonable estimate of future water use if existing slickwater stimulation techniques were to be applied to all horizontal wells forecasted in the RFD over the next 20 years, versus the use of less water-intensive stimulation technologies like those under the nitrogen scenario.

Water use estimates could be lowered if operations used nonaqueous or reduced-water fracturing techniques and reused flowback water from hydraulic fracturing or from normal production (BLM 2015b). Additionally, as technology changes, other sources of water could become available for use (**Appendix I**). In response to the water usage issue, the industry has applied strategies and technologies to reduce the need for freshwater for stimulation. These strategies and technologies include using produced water, reusing flowback water, using only saline or non-potable water, and using foam fracturing (Engler et al. 2015). Use of produced water for hydraulic fracturing has become more common as treatment of the water is more achievable (EPA 2016b).

Sections 3.1.3 and 3.1.4 of the WSD (**Appendix I**) contain additional background information on and estimates of water use for slickwater fracturing in the FFO, information regarding the methodology for capturing information and calculating water use for slickwater stimulation techniques, and strategies to reduce water used for hydraulic fracturing. As these techniques become more common in the industry, impacts on potable and freshwater resources as a result of hydraulic fracturing are likely to decrease.

Water Quality

Groundwater quality has been improving as a result of protection measures, such as reducing or collecting and treating wastewater and reducing the rate of decline in groundwater levels. At the same time, increased urban, industrial, and agricultural development could increase point and nonpoint pollutant loadings to both surface water and groundwater. Concentrations of salts could be increased by reducing recharge from precipitation, increasing water use, and discharging treated municipal and industrial water and irrigation return flows (BLM 2015b).

Groundwater in the northern portion of the San Juan Basin has seen impacts from production of CBM from the Fruitland Formation during the mid- to late 1990s. These impacts are from when the formation water in the coal beds was removed to stimulate gas production from the formation. Large-scale dewatering of the Fruitland Formation coal beds triggered off-gassing of CBM in areas where the coal beds outcrop at the surface. In some cases, this apparently triggered fires in the exposed coal outcrops (Ayers 1994). CBM production has tapered off slightly from its peak from 1998 to 2000, but the San Juan Basin is still the largest producer of CBM in the United States.

Oil and gas development and production at the surface and belowground can affect water quality. At the surface, activities at a drill site or production facility, such as road and well-pad construction, leaks from pits or tanks, chemical spills, and discharge of wastewater, can affect surface water and shallow groundwater quality. Spills associated with oil and gas development may reach surface water directly during the spill event. Spills may also reach surface waters indirectly when the spill has occurred and either a rain event or

snowmelt moves contaminants into nearby surface water bodies through surface water flow or even subsurface groundwater flow into springs that discharge into a surface water body.

There were a total of 106 spills in the New Mexico portion of the San Juan Basin in 2018. The volumes of spilled oil, natural gas, and produced water comprise approximately 2.0 percent, 0.0003 percent, and 0.01 percent, respectively, of 2017 oil, natural gas, and produced water values. Section 3.2.3 of the WSD summarizes spill data from the San Juan Basin, and Appendix C of the WSD contains a methodology for analyzing spill data (see **Appendix I**).

Belowground activities can affect shallow and deep groundwater quality. Examples of this are leaks during or following hydraulic fracturing, failed casing seals, pipeline breaks, abandoned wells, deep-well disposal of flowback or produced wastewater, and induced subsurface migration pathways (USGS 2012).

The rapid increase in use of well stimulation techniques to obtain oil and gas from tight formations or from depleted fields has triggered public demand for more assurances that the methods are safe and will not affect groundwater and the environment in general. Better understanding of the causes of past environmental problems associated with well stimulation, improved drilling and well construction techniques, and increased regulatory oversight have led to a lower risk of releases; however, the field is rapidly changing. While state regulatory agencies have gradually increased their levels of oversight and standards, as demonstrated by those rules and regulations identified under *Regulatory Framework* above, the BLM has also proposed additional, more stringent requirements for lessees. This is to ensure minimum standards are upheld and to reassure the public. This trend is likely to continue.

Since the advent of hydraulic fracturing, more than 1 million hydraulic fracturing treatments have been conducted (**Appendix I**). Requirements of Onshore Order No. 2 (along with adherence to state regulations) make contamination of groundwater resources highly unlikely, and there have not been any documented past instances of groundwater contamination attributed to well drilling.

Environmental Consequences

BLM Alternatives

The region of influence for analyzing impacts on water resources is the BLM surface decision area.

Impacts Common to All BLM Alternatives

Vegetation Management and Lands with Wilderness Characteristics

Under all BLM alternatives, vegetation treatments could affect surface water quality through increased sedimentation from surface disturbance. These impacts, however, would be mitigated by application of vegetation management actions described in **Table 2-2**, such as applying measures from the 2000 Aquatic and Riparian Habitat Management Plan (BLM 2000) that would prevent and manage erosion in riparian areas. In the long term, vegetation treatments would reduce erosion and sedimentation, thereby reducing TDS levels and improving surface water quality. Treatments resulting in more natural and healthy vegetation communities may also increase groundwater recharge.

Management of lands with wilderness characteristics would not independently contribute to impacts on water supply or surface water. Restrictions on fluid mineral and ROW development in lands managed to protect wilderness characteristics as a priority over other multiple uses are included in the overall discussion of impacts from fluid minerals and lands and realty management under each alternative. For these reasons, vegetation and lands with wilderness characteristics management are not discussed further in this section.

Fluid Minerals and Lands and Realty

Water Quality

Research has shown that NPDES outfalls within 656 feet of a body of water likely discharge into that body of water (IDEM 2003). Oil and gas and ROW development within this distance of water bodies that discharge pollutants would degrade water quality. Impacts would be mitigated wherever the BLM applied COAs or

relocated proposed oil and gas facilities as needed, up to 656 feet, using its authority under BLM regulations (43 CFR 3101.1-2), to avoid impacts on these resources. Similarly, impacts would be mitigated where the BLM used its discretion in approval of ROW authorizations to relocate proposed ROWs as needed to avoid impacts on seeps/springs.

Water Supply

While the BLM does not regulate water use, the projected amount of water used under each alternative is discussed to compare the relative potential impacts on water supply. **Table 3-18** compares projected water use for oil and gas development on federal mineral estate in the next 20 years for each alternative under the nitrogen hydraulic fracturing technology scenario (the nitrogen scenario) and the slickwater stimulation scenario (the slickwater scenario). For more detail on the methods used to calculate this usage, see **Appendix I**. As discussed under *Trends*, above, operators are increasingly expected to use non-potable saline groundwater, produced water, or flowback water for hydraulic fracturing, which would limit effects on potable water supply in the planning area.

BLM No Action Alternative

Fluid Minerals and Lands and Realty

Water Supply

Oil and gas development under the BLM No Action Alternative is projected to result in the use of 7,500 af of water in the next 20 years, according to the RFD nitrogen scenario. This assumes that development would continue under older hydraulic fracturing techniques like nitrogen completions; however, under the slickwater scenario, development would result in the use of up to 81,400 af of water (see **Table 3-18**).

While the BLM encourages the use of produced water and reuse of flowback water in oil and gas development, it is not a currently mandated prescription. Accordingly, no management actions regarding the reuse of produced water and flowback water in oil and gas development would apply under the BLM No Action Alternative. This would continue to allow for the use of natural water supplies for these purposes, which could reduce or deplete potable water supplies. These impacts would be mitigated if operators continue to voluntarily increase use of non-potable water.

Water Quality

Management actions that close areas to fluid mineral leasing, establish NSO and CSU stipulations for fluid minerals, and establish ROW exclusion and avoidance areas would continue to prevent and minimize surface disturbances, which can cause soil compaction and erosion and result in impacts on water quality, such as increased TDS levels and pollutant runoff. **Table 3-19** and **Table 3-20** show the number of stream miles and impaired stream miles in the BLM mineral and surface decision areas that would be subject to this protective management. NSO and CSU stipulations would continue to have the greatest influence on water resources under the BLM No Action Alternative.

Because there would not be any stipulation specifically restricting leasing or ROW activity in seeps/springs, surface disturbance in the vicinity of these resources could affect their water quality by increasing erosion, compacting the soil to increase pollutant runoff, and increasing the risk of spills. The BLM would not apply lease stipulations or ROW avoidance or exclusion management to lands near domestic water wells or community water sources. This would allow the potential siting of fluid mineral developments and ROWs near these water sources, which could degrade water quality if spills, erosion, or soil compaction occurred. Impacts on seeps/springs, domestic water supplies, and other surface waters would be mitigated where the BLM applied COAs to APDs or similar restrictive measures to ROWs to relocate facilities up to 656 feet away from these resources.

Table 3-18
Projected Water Use for Hydrologic Fracturing of Wells on Federal Mineral Estate, 2018–2037 (af)¹

BLM Alternative	No Action	Alternative A	Alternative B1	Alternative B2	Alternative C1	Alternative C2	Alternative C3	Alternative C4	Alternative C5	Alternative C6	Alternative D
Number of Wells per Alternative	3,093	2,619	2,622	2,345	3,085	3,082	3,079	3,076	3,068	3,073	3,101
Nitrogen Scenario	7,500	5,700	5,600	4,400	7,400	7,400	7,400	7,400	7,400	7,400	7,500
Slickwater Scenario	81,400	63,000	61,600	47,500	81,200	81,100	81,100	81,000	80,800	80,900	81,700

¹Water use for each alternative was calculated using the following formula. This formula and its rationale can also be found in Appendix I:

For the nitrogen scenario: (number of horizontal wells on federal land x 4.84) + (number of vertical wells on federal land x .537)

For the slickwater scenario: (((number of horizontal wells on federal land x 2 x 5,280)/200) x 334,000)/32,5851) + (number of vertical wells on federal land x .537)

Table 3-19
All Streams Protected from Surface Disturbances or in Areas with Surface Disturbance Limitations in BLM Mineral and BLM Surface Decision Areas by Alternative

Alternative	Closed to Fluid Mineral Leasing—BLM Mineral	Closed to Fluid Mineral Leasing—Only BLM Surface	Fluid Minerals with NSO Stipulations—BLM Mineral	Fluid Minerals with NSO Stipulations—Only BLM Surface	Fluid Minerals with CSU Stipulations—BLM Mineral	Fluid Minerals with CSU Stipulations—Only BLM Surface	ROW Avoidance—Only BLM Surface	ROW Exclusion—Only BLM Surface
BLM No Action Alternative (Miles)	455	401	7,648	4,811	5,303	3,754	0	0
Percentage in BLM mineral	5	5	95	59	66	46	N/A	N/A
Percentage in BLM surface	N/A	8	N/A	91	N/A	71	0	0
BLM Alternative A (miles)	2,240	1,598	6,469	3,953	2,740	2,148	4,797	101
Percentage in BLM mineral	28	20	80	49	34	27	N/A	N/A
Percentage in BLM surface	N/A	30	N/A	75	N/A	41	89	2
BLM Sub-Alternative B1 (miles)	3,044	2,040	5,650	3,508	2,604	2,029	3,968	84
Percentage in BLM mineral	38	25	70	43	32	25	N/A	N/A
Percentage in BLM surface	N/A	38	N/A	66	N/A	38	74	2
BLM Sub-Alternative B2 (miles)	3,457	2,361	5,238	3,187	2,423	1,877	3,968	84
Percentage in BLM mineral	43	29	65	39	30	23	N/A	N/A
Percentage in BLM surface	N/A	45	N/A	60	N/A	36	74	2
BLM Sub-Alternative C1 (miles)	455	401	577	367	4,409	3,494	3,609	8
Percentage in BLM mineral	5	5	7	5	54	43	N/A	N/A
Percentage in BLM surface	N/A	7	N/A	7	N/A	65	67	<1
BLM Sub-Alternative C2 (miles)	455	401	764	427	4,669	3,639	3,609	8
Percentage in BLM mineral	5	5	9	5	58	45	N/A	N/A
Percentage in BLM surface	N/A	7	N/A	8	N/A	69	67	<1
BLM Sub-Alternative C3 (miles)	455	401	891	478	4,669	3,639	3,609	8
Percentage in BLM mineral	5	5	11	6	58	45	N/A	N/A
Percentage in BLM surface	N/A	7	N/A	9	N/A	69	67	<1
BLM Sub-Alternative C4 (miles)	455	401	1,057	577	4,669	3,639	3,609	8
Percentage in BLM mineral	5	5	13	7	58	45	N/A	N/A
Percentage in BLM surface	N/A	7	N/A	11	N/A	69	67	<1

3. Affected Environment and Environmental Consequences (Water Resources)

Alternative	Closed to Fluid Mineral Leasing— BLM Mineral	Closed to Fluid Mineral Leasing— Only BLM Surface	Fluid Minerals with NSO Stipulations— BLM Mineral	Fluid Minerals with NSO Stipulations— Only BLM Surface	Fluid Minerals with CSU Stipulations— BLM Mineral	Fluid Minerals with CSU Stipulations— Only BLM Surface	ROW Avoidance— Only BLM Surface	ROW Exclusion— Only BLM Surface
BLM Sub-Alternative C5 (miles)	455	401	1,276	727	4,669	3,639	3,609	8
Percentage in BLM mineral	5	5	16	9	58	45	N/A	N/A
Percentage in BLM surface	N/A	7	N/A	14	N/A	69	67	<1
BLM Sub-Alternative C6 (miles)	626	453	1,276	727	4,669	3,639	3,609	8
Percentage in BLM mineral	8	6	16	9	58	45	N/A	N/A
Percentage in BLM Surface	N/A	9	N/A	14	N/A	69	67	<1
BLM Alternative D (miles)	455	401	187	176	5,210	3,746	4,714	8
Percentage in BLM mineral	5	5	2	2	64	46	N/A	N/A
Percentage in BLM surface	N/A	8	N/A	3	N/A	71	89	<1
Total streams in BLM mineral (Miles)	8,090							
Total streams in BLM surface (Miles)	5,284							

Source: BLM GIS 2019

Table 3-20
Miles of Impaired Streams Protected from Surface Disturbances in BLM-Managed Mineral and Surface Decision Areas by Alternative

Alternative	Closed to Fluid Mineral Leasing— BLM Mineral	Closed to Fluid Mineral Leasing— Only BLM Surface	Fluid Minerals with NSO Stipulations— BLM Mineral	Fluid Minerals with NSO Stipulations— Only BLM Surface	Fluid Minerals with CSU Stipulations— BLM Mineral	Fluid Minerals with CSU Stipulations— Only BLM Surface	ROW Avoidance— Only BLM Surface	ROW Exclusion— Only BLM Surface
BLM No Action Alternative (miles)	1	0	61	11	55	5	0	0
Percentage of total impaired streams in BLM mineral	1	0	88	16	80	7	N/A	N/A
Percentage of total impaired streams in BLM surface	N/A	0	N/A	100	N/A	45	0	N/A
BLM Alternative A (miles)	59	7	10	4	0	0	11	0
Percentage of total impaired streams in BLM mineral	86	10	14	6	0	0	N/A	N/A
Percentage of total impaired streams in BLM surface	N/A	64	N/A	36	N/A	0	100	N/A
BLM Alternative B¹ (miles)	63	9	6	2	1	1	11	0
Percentage of total impaired streams in BLM mineral	91	13	9	3	1	1	N/A	N/A
Percentage of total impaired streams in BLM surface	N/A	82	N/A	18	N/A	9	100	N/A
BLM Alternative C (miles)²	1	0	17	11	18	9	11	0
Percentage of total impaired streams in BLM mineral	1	0	25	16	30	16	N/A	N/A
Percentage of total impaired streams in BLM surface	N/A	0	N/A	100	N/A	82	100	N/A
BLM Alternative D (miles)	1	0	11	10	55	5	11	0
Percentage of total impaired streams in BLM mineral	1	0	88	16	80	7	N/A	N/A
Percentage of total impaired streams in BLM surface	N/A	0	N/A	100	N/A	45	100	N/A
Total impaired streams in BLM mineral (miles)	69							
Total impaired streams in BLM surface (miles)	11							

Source: BLM GIS 2019

¹Includes BLM Sub-Alternatives B1 and B2²Includes BLM Sub-Alternatives C1–C6

BLM Alternative A

Fluid Minerals and Lands and Realty

Water Supply

Oil and gas development under BLM Alternative A is projected to result in the use of 5,700 af of water, according to the RFD nitrogen scenario. This is a 24 percent reduction in water use when compared with the BLM No Action Alternative. This assumes that development would continue under older hydraulic fracturing techniques like nitrogen completions; however, under the slickwater scenario, development would result in the use of up to 63,000 af of water (see **Table 3-18**).

Under this alternative, the BLM would require companies to reuse produced water and flowback water in oil and gas development, when feasible, as determined by the BLM Authorized Officer. Reusing water would minimize the depletion of water supplies. Further, as the WSD notes (see **Appendix I**), the voluntary use of non-potable water for oil and gas activities continues to increase, which would reduce the depletion of potable/freshwater resources. Ultimately, because of the reduced number of projected wells and the requirement to use flowback and produced water, BLM Alternative A would reduce the depletion of water supplies more so than the BLM No Action Alternative.

Water Quality

Applying an NSO stipulation for 656 feet around seeps/springs would preserve the water quality of these resources by preventing erosion and soil compaction and reducing spill risk. Applying an NSO stipulation within 1,000 feet of all domestic water wells or community water sources would reduce the potential for degrading water quality in these water sources. If drilling near these sources is prohibited, based on site-specific analysis, risks of their underground contamination would also be reduced. These NSO stipulations would add certainty that facilities would not be sited adjacent to these resources, which could reduce impacts compared with the BLM No Action Alternative, depending on how the BLM used its discretion under that alternative to prevent impacts. Avoiding siting ROWs near public water supply intakes would reduce the potential for water quality impacts from erosion, soil compaction, and increased spill risk. BLM Alternative A could reduce impacts of ROW development on water resources compared with the BLM No Action Alternative if management under the BLM No Action Alternative does not result in avoidance of these areas.

Closing more areas to fluid mineral development and establishing more ROW avoidance and exclusion areas would protect water quality from surface disturbance and spill risk to a greater degree than the No Action Alternative. **Table 3-19** and **Table 3-20** show the number of stream miles and impaired stream miles in the BLM mineral and surface decision areas that would be subject to protective management.

BLM Alternative B (Includes BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

Lands and Realty

Water Quality

Avoiding public water supply intakes would reduce impacts on these resources as described under BLM Alternative A. BLM Alternative B could reduce impacts of ROW development on water resources compared with the BLM No Action Alternative if management under the BLM No Action Alternative does not result in avoidance of these areas.

Impacts on streams and impaired streams from management actions that establish ROW exclusion and avoidance areas would be the same as those under BLM Alternative A; management would be more protective than the BLM No Action Alternative. **Table 3-19** and **Table 3-20** show the number of stream miles and impaired stream miles in the BLM mineral and surface decision areas that would be subject to protective management.

Fluid Minerals

BLM Sub-Alternatives B1 and B2

Water Supply

Unlike the BLM No Action Alternative, under BLM Alternative B, the BLM would encourage, but not require, companies to use produced water or reuse flowback water in oil and gas development. This would continue to allow for the use of natural water supplies for these purposes, which could reduce or deplete potable water supplies. These impacts would be mitigated if operators continue to voluntarily increase use of non-potable water.

Water Quality

Under both sub-alternatives under BLM Alternative B, applying an NSO stipulation for 150 feet and a CSU stipulation for another 500 feet around seeps/springs would preserve the conditions of these resources, as described under BLM Alternative A. Applying a CSU stipulation within 1,000 feet of all domestic water wells or community water sources would reduce the potential for degrading the water quality of these sources but could still allow for some surface disturbance near them. The stipulations would add certainty that facilities would not be sited adjacent to these resources without mitigation measures. This could reduce impacts compared with the BLM No Action Alternative, depending on how the BLM used its discretion under that alternative to prevent impacts.

Similar to BLM Alternative A, BLM Alternative B would rely on closing more areas to fluid mineral development and establishing more ROW avoidance and exclusion areas to protect water resources. **Table 3-19** and **Table 3-20** show the number of stream miles and impaired stream miles in the BLM mineral and surface decision areas that would be subject to protective management.

Alternative B1

Water Supply

Oil and gas development under BLM Sub-Alternative B1 is projected to result in the use of 5,600 af of water, according to the RFD nitrogen scenario. This is a 25 percent reduction in water use when compared with the BLM No Action Alternative. This assumes that development would continue under older hydraulic fracturing techniques like nitrogen completions. However, under the slickwater scenario, development would result in the use of up to 61,600 af of water (see **Table 3-18**).

Water Quality

Under this sub-alternative, there would be a less than 1 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 81,800 acres of BLM surface decision area as NSO and 96,300 acres of BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for impacts on water quality from surface disturbance, when compared with the BLM No Action Alternative.

Alternative B2

Water Supply

Oil and gas development under BLM Sub-Alternative B2 is projected to result in the use of 4,400 af of water, according to the RFD nitrogen scenario. This is a 41 percent reduction in water use when compared with the BLM No Action Alternative. This assumes that development would continue under nitrogen completions. However, under the slickwater scenario, development would result in the use of up to 47,500 af of water (see **Table 3-18**).

Water Quality

Under BLM Alternative B2, when compared with the No Action Alternative, there would be a 9 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area (see **Table 3-1**, RFD Projections by Alternative). Managing 398,100 acres of BLM surface decision area

as NSO and 571,300 acres of BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for impacts on water quality from surface disturbance, when compared with the BLM No Action Alternative.

BLM Alternative C (Includes BLM Sub-Alternatives C1 to C6; applying only to Fluid Minerals)

Fluid Minerals and Lands and Realty

Water Supply

Oil and gas development under these sub-alternatives is projected to result in the use of 7,500 af of water over the next 20 years, according to the RFD nitrogen scenario (see **Appendix I** for individual projections). This is about the same amount of water used under the BLM No Action Alternative. This assumes that development would continue under nitrogen completions. However, under the slickwater scenario, development would result in the use of between 80,800 and 81,200 af of water (see **Table 3-18**).

Like BLM Alternative B1, voluntary reuse and increased use of non-potable water could mitigate depletion of potable water supplies.

Water Quality

Impacts of management around seeps/springs would be the same as described under the BLM No Action Alternative. Impacts of applying an NSO stipulation within 1,000 feet of all domestic water wells and community water sources would be the same as those described under BLM Alternative A. This NSO stipulation would add certainty that facilities would not be sited adjacent to these resources. This could reduce impacts compared with the BLM No Action Alternative, depending on how the BLM used its discretion under that alternative to prevent impacts.

Avoiding siting ROWs near public water supply intakes would reduce the potential for water quality impacts, as described under BLM Alternative A. This could reduce impacts of ROW development on water resources compared with the BLM No Action Alternative, if management under the BLM No Action Alternative does not result in avoidance of these areas.

BLM Alternative C would have almost the same potential for overall surface disturbance impacts on water quality as the BLM No Action Alternative. The BLM would manage 5,900 acres of surface lands as ROW avoidance areas, which would include public water supply intakes. Avoiding public water supply intakes would result in the same impacts as those described under BLM Alternative A. BLM Alternative C could reduce impacts of ROW development on water resources compared with the BLM No Action Alternative, if management under the BLM No Action Alternative would result in avoidance of these areas.

BLM Alternative C would protect more impaired streams through NSO and CSU stipulations and ROW exclusion and avoidance areas than the BLM No Action Alternative. **Table 3-19** and **Table 3-20** show the number of stream miles and impaired stream miles in the BLM mineral and surface decision areas that would be subject to protective management.

Under all sub-alternatives, there would be a less than 1 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). In areas managed as closed or subject to NSO stipulations, localized impacts of new oil and gas-related surface disturbance on water resources would be prevented. These measures would reduce the potential for impacts on water resources, compared with the BLM No Action Alternative.

BLM Alternative D

Fluid Minerals and Lands and Realty

Water Supply

Oil and gas development under BLM Alternative D is projected to result in the use of 7,500 af of water over the next 20 years, according to the RFD nitrogen scenario. This is about the same amount of water used

under the BLM No Action Alternative. This assumes that development would continue under nitrogen completions. However, under the slickwater scenario, development would result in the use of up to 81,700 af of water (see **Table 3-18**).

Like BLM Alternative B, voluntary reuse and increased use of non-potable water could mitigate depletion of potable water supplies.

Water Quality

Impacts of BLM management around seeps/springs, domestic water wells, and community water sources would be the same as those described under the BLM No Action Alternative.

BLM Alternative D would have similar potential for overall surface disturbance impacts on water quality as the BLM No Action Alternative. **Table 3-19** and **Table 3-20** show the number of stream miles and impaired stream miles in the BLM mineral and surface decision areas that would be subject to protective management. The BLM would manage 5,900 acres of surface lands as ROW avoidance areas. ROW avoidance areas would limit surface disturbances that are capable of degrading water resources, but they would not include public water supply intakes. Alternative D could reduce impacts of ROW development on water resources compared with the BLM No Action Alternative, if management under the BLM No Action Alternative does not result in avoidance of these areas.

BIA Alternatives

The region of influence for analyzing impacts on water resources is the BIA surface decision area.

Impacts Common to All BIA Alternatives

Under all BIA alternatives, the Navajo Nation's rights respecting the use of water would continue to be unimpaired. This would continue to allow the Navajo Nation to control how fluid mineral activities affect water resource conditions, water quality, and water supplies.

Under the revised 2018 RFD projections (**Appendix I**), oil and gas development under the BIA alternatives is anticipated to result in the use of 1,700 af of water over the next 20 years. This assumes that development would continue under older hydraulic fracturing techniques like nitrogen completions. However, with slickwater hydraulic fracturing techniques and assuming maximum water use, development would result in the use of up to 18,100 af of water.

During its review of APDs in the BIA mineral decision area, the BLM could issue COAs to relocate oil and gas facilities up to 656 feet outside of sensitive water sources, such as seeps/springs, to avoid impacts on those areas from surface disturbance and spills.

BIA No Action Alternative

For fluid mineral ROWs, erosion associated with access roads would continue to be corrected. This would continue to minimize degradation of water resource conditions and water quality from this erosion.

The lessee would continue to not be allowed to drill any well within 500 feet of any house, structure, structure on a home site lease, or reservoir of water, live stream, or other body of water without the written consent of the Navajo Nation Minerals Department and the NNVCA. This would continue to minimize impacts on water resource conditions, water quality, and water supplies.

BIA Alternative A

For fluid mineral ROWs, operators would ensure that roads are maintained in accordance with Clean Water Act (CWA) 404, 401, and 402 standards and in accordance with relevant standards regarding road maintenance and erosion. This would maintain dirt roads in a manner that minimizes impacts on water resource conditions and water quality, resulting in fewer impacts than the BIA No Action Alternative.

Lessees would not drill any well within 1,320 feet (0.25 miles) of any residential or community structures. Compared with the BIA No Action Alternative, this would increase the distance and change the focus of sites where drilling wells would be prohibited by providing greater protection to areas inhabited by humans.

The Navajo Nation's rights respecting the use of water would be unimpaired. A lessee would not use any waters of the Navajo Nation—such as wells, tanks, rivers, springs, washes, creeks, and stock water reservoirs—without a water use permit issued by the NNWCA. A lessee would not drill any water wells for its use without a drilling permit from the Water Code Administration. This would continue to allow the Navajo Nation to control how fluid mineral activities affect water resource conditions, water quality, and water supplies. It would also establish parameters for drilling that could be used to ensure that water resources are not degraded due to any permit requirements.

BIA Alternative B

The impacts on water under BIA Alternative B would be the same as those under BIA Alternative A.

BIA Alternative C

The impacts on water under BIA Alternative C would be the same as those under BIA Alternative A.

BIA Alternative D

The impacts on water resource conditions and water quality from maintaining roads would be similar to those under BIA Alternative A; however, the impacts under BIA Alternative D would affect only Navajo Tribal trust lands.

The impacts on water resource conditions, water quality, and water supplies from the prohibition on drilling wells would be similar to those under BIA Alternative A. The impacts under BIA Alternative D, however, would affect only Navajo Tribal trust lands, and the lessee would not be able to drill any well within 500 feet of the identified structures.

The impacts on Navajo Nation water rights would be the same as those under BIA Alternative A.

Cumulative Effects

The cumulative impact analysis for water resources is the planning area. Combined with other past, present, and reasonably foreseeable future actions as described in the affected environment, above, activities and development in the BLM and BIA decision areas would contribute to short- and long-term surface and subsurface disturbances. This would result in impacts on water resource conditions, water quality, and water supplies. Past, present, and future energy and minerals development, land use authorizations, livestock grazing, recreation, travel, vegetation and rangeland treatments and projects (such as revegetation efforts from the Navajo Gallup Waterline Project), forest gathering and cutting, water infrastructure, and fires would continue to disturb soils. This would be due to, for example, trampling or removing vegetation, constructing facilities and energy infrastructure, constructing and using access roads, and traveling overland.

Increasing recreation pressure could continue to disturb vegetation and spread noxious weeds and invasive plant species, which may result in a reduction of soil stability and an increase in erosion rates. In turn, water resource conditions, water quality, and water supplies would be affected by compacted soil and increased transport of soil to surface water bodies. The impacts of changing climate conditions on water resources may be subtle or dramatic and could be difficult to detect until a change threshold has been crossed. This could result in growing impacts on water resources when combined with warmer temperatures, changes in rainfall and runoff, and the resulting shifts in vegetation communities. This would be the case particularly on those lands with extensive surface disturbance and development.

Development of fluid mineral resources impacts water resources in the planning area through surface disturbance and water use for mineral extraction and development of ROWs. Continued fluid mineral development generally requires both permanent and temporary roads, pits, drilled wells, and associated well pads.

In addition, fluid mineral development may require associated pipelines and transmission lines and the necessary service roads for these facilities. Impacts from fluid mineral exploration and development on BLM-managed, BIA-managed, and other surface management agency lands may result in additional disturbance and water use; however, similarly restrictive measures would protect water resources and minimize the potential for degrading water resource conditions, water quality, and water supplies.

Cumulative impacts on water resources could increase over time. Under the BLM No Action Alternative, NSO and CSU stipulations would be applied to minimize impacts on water resources. BLM Alternative B would result in the least contribution to cumulative surface disturbance impacts on water resources because it would close the most areas to fluid mineral leasing. BLM Alternative C would prevent impacts on water resources in areas with NSO stipulations and minimize cumulative impacts on water resources in areas with CSU stipulations.

As seen in **Table 3-21**, based on the projections contained in the RFD scenario for slickwater hydraulic fracturing technology, the total maximum projected water use associated with hydraulic fracturing in the planning area over the next 20 years would be the highest under Alternative D (approximately 120,900 acre-feet, assuming all wells would be hydraulically fractured using slickwater technology and that no other technologies, like using nitrogen, would be used to reduce water consumption; see **Appendix I**). All sub-alternatives under Alternative C would result in approximately 120,000 af used for hydraulic fracturing. Sub-Alternative B2 would use the least amount of water at 86,700 af.

Under the nitrogen scenario RFD projections, the maximum total water use projection for the planning area (11,615 af) over a 20-year time period yielded an annual estimate of 580 af per year. As noted above, the maximum water use scenario that could occur under the use of slickwater hydraulic fracturing techniques results in an estimate of 125,000 af of water used for oil and gas development (**See Appendix I**).

The scenario above assumes that all water used would be from new sources. This scenario does not account for any potential use of slickwater fracturing techniques that reduce freshwater use, like use of produced water, reuse of flowback water, or use of saline/nonpotable water. As noted in the *Trends – Water Supply* section above, it should be noted that the nitrogen scenario of hydraulic fracturing depends on the use of fresh, nonsaline water, even though it uses less water; on the other hand, slickwater hydraulic fracturing uses more water, but can rely on non-potable, saline, or reused water. All these techniques could alter impacts on freshwater resources related to hydraulic fracturing. It is not possible to predict the impacts on any particular aquifer because the water is sourced from different locations for each individual project. The BLM will undertake more site-specific analysis of impacts on groundwater, to the extent practicable at the APD level, when the agency has better information on the sources of the water used for a particular project. Groundwater is not under the BLM's jurisdiction to manage as NMOSE has the responsibility for measuring, appropriating and distributing the public waters of the state under NMSA 1978, § 72-2-1.

BLM Alternative B would prevent the most cumulative impacts on water resources through an emphasis on ROW exclusion areas. Under all action alternatives, preventing or minimizing disturbances, and their impacts on water resources, would be emphasized.

In addition, vegetation treatments can help maintain and improve conditions for soil resources under all action alternatives, especially Alternatives B, C, and D, which prioritize soil stability. Protecting and stabilizing soils would result in benefits to water resource conditions, water quality, and water supplies. Implementing BMPs would further reduce cumulative impacts on water resources.

Table 3-21
Projected Cumulative Water Use for Hydrologic Fracturing of Wells on Federal Mineral Estate, 2018–2037 (af)

BLM Alternative	No Action	Alternative A	Alternative B1	Alternative B2	Alternative C1	Alternative C2	Alternative C3	Alternative C4	Alternative C5	Alternative C6	Alternative D
Number of Wells per Alternative	3,093	2,619	2,622	2,345	3,085	3,082	3,079	3,076	3,068	3,073	3,101
Slickwater Scenario	120,600	102,200	100,800	86,700	120,400	120,300	120,300	120,200	120,100	120,200	120,900
Nitrogen Scenario	11,200	9,500	9,400	8,100	11,200	11,200	11,200	11,200	11,200	11,200	11,200

¹Water use for each alternative was calculated using the following formula. This formula and its rationale can also be found in **Appendix I**:

For the nitrogen scenario: (total number of horizontal wells x 4.84) + (total number of vertical wells x .537)

For the slickwater scenario: (((total number of horizontal wells x 2 x 5,280)/200) x 334,000)/32,5851) + (total number of vertical wells x .537)

3.4.4 Riparian Areas and Wetlands

Affected Environment

Current Conditions and Trends

There are approximately 88 miles of perennial and intermittent riparian habitats (NHD GIS 2016) in the BLM and BIA decision areas. The perennial systems—the San Juan, Animas, and La Plata Rivers—flow continuously. The intermittent systems—portions of Largo Canyon and Cereza Canyon—flow for a portion of the year. The ephemeral systems have continuous subsurface water flow and have surface flow during precipitation. The BLM FFO has designated riparian areas in the BLM decision area to which special management constraints are applied for development and during the livestock grazing season. These are the Ephemeral Wash Riparian Area SDA and the River Tracts ACEC.

Riparian/wetland vegetation occupies approximately 39,800 acres (FWS GIS 2016) of BLM- and BIA-managed surface acres in the planning area. The soils in these areas typically are stratified sediments of varying textures that are subject to intermittent flooding or fluctuating water tables that may reach the surface.

Springs also occur in the planning area (see **Figure 3-9**, Current Inventory Wetlands, Riparian Areas, and Springs). These are an important component of the desert ecosystem for a number of reasons. Historically, springs were the only reliable source of water for humans and animals. They have become known as biodiversity hotspots that support a large proportion of the aquatic and riparian species in arid regions. Several hundred species or subspecies of fishes, mollusks, crustaceans, aquatic insects, and plant species are endemic to springs in the western United States (Sada and Pohlman 2002). Springs and seeps are often important to Tribes and may be considered CIMPPs, which are discussed greater detail in **Section 3.4.9**, Cultural Resources and **Section 3.7.1**, Native American Tribal Interests and Uses.

Riparian vegetation community characteristics are described further in **Appendix G**, FFO Vegetation Communities Descriptions and Determination of FFO Vegetation Condition Classes.

In some riparian areas, nonnative trees such as tamarisk and Russian olive have established in sites previously dominated by native cottonwood and willow, especially in areas where hydrologic modifications and land use practices have favored nonnative establishment. For example, tamarisk and Russian olive are relatively drought tolerant and can establish and survive along highly altered waterways where native riparian trees (e.g., cottonwood, willow) cannot. These nonnatives have been removed from nearly 7,000 acres of riparian habitat; because of this, routine maintenance will be required. Several factors have led to the establishment of other nonnative herbaceous species such as Canada thistle and Russian knapweed, such as unauthorized livestock grazing, wildlife, recreation, unauthorized OHV use, encroachment from uplands, wild and feral horses, and seed transport via humans, wind, and water. Removal of nonnative riparian trees may also facilitate colonization and expansion of secondary weeds (NMDGF 2017).

BLM

Designated areas that are managed specifically for riparian resources include the Ephemeral Wash Riparian Area SDA and River Tracts ACEC. Sources of riparian degradation are unauthorized livestock grazing during the BLM deferment period, irrigation diversions, flow regulations in the San Juan River, and fluctuations in subsurface hydrology, likely due to drought (BLM 2000). The BLM restricts livestock grazing in the Ephemeral Wash Riparian Area SDA and River Tracts ACEC during the growing season for vegetation.

Field data from BLM PFC studies compiled throughout the planning area since 1998 indicate that overall trends in riparian and wetland habitats on BLM-managed lands have been improving. This is likely due to the implementation of the BLM Riparian and Aquatic Habitat Management Plan since 2000.

BIA

The BIA and the Navajo Nation do not have areas managed specifically for riparian resources.

Environmental Consequences

This section discusses impacts on riparian areas and wetlands from proposed management actions for other resources and resource uses. Existing conditions concerning riparian areas and wetlands are described above. Areas discussed are those outside of the River Tracts ACECs. River Tract ACECs management would not change under the FMG RMPA/EIS.

BLM Alternatives

Impacts Common to All BLM Alternatives

Under all alternatives, the BLM would prohibit oil and gas operations in floodplains, wetlands, and riparian areas as required in Onshore Order Number 1, part IV (*Federal Register* 72, no. 44 (March 7, 2007): 10328). The BLM would apply COAs to minimize impacts on riparian areas and wetlands and would relocate proposed oil and gas facilities as needed, up to 656 feet, using its authority under BLM regulations (43 CFR 3101.1-2), to avoid impacts on these resources. Similarly, the BLM would use its discretion in approval of ROW authorizations to relocate proposed ROWs as needed to avoid impacts on riparian areas and wetlands.

Where cultural and Tribal resources occur in wetland and riparian areas, impacts on wetland and riparian vegetation would be reduced under all alternatives. This would come about by management limiting or preventing surface disturbance and vegetation removal to protect cultural and Tribal resources.

Under all BLM alternatives, the BLM may apply COAs (shown in **Appendix C**, BLM and BIA COAs) to promote rapid reclamation, maximize resource protection, and minimize soil erosion. Where these requirements are applied, they would reduce the likelihood for unmitigated loss of wetlands and riparian areas. For example, applying a COA that would prohibit facility locations within 656 feet (200 meters) of ephemeral and perennial drainages and wetlands and riparian areas would reduce impacts on riparian areas and wetlands by distancing development and associated land use, visitation, and construction runoff. This COA would also require that roads and pipelines crossing drainages have mitigations that would minimize surface disturbance and reduce or eliminate erosion. Erosion moves riparian and wetland areas away from PFC.

Similarly, the BLM may apply COAs to prevent the establishment and spread of weeds. For example, straw, mulch, or other vegetation material transported and used on public lands could be required to be certified noxious weed free.

Under all BLM alternatives, the BLM would continue to apply measures in the 2000 Aquatic and Riparian Habitat Management Plan (BLM 2000), updating measures as needed based on best available data and guidance. This includes mitigating mineral exploration and development effects by reclaiming and using beneficial runoff or drainage for riparian habitat development. Additionally, measures include using structures for erosion control, accelerating soil and water conservation efforts to stabilize banks, and locating roads, constructions, and maintenance outside of riparian areas. These efforts would reduce riparian degradation and loss of wetland function.

Under all BLM alternatives, pipelines would be required to follow ROWs or disturbance areas unless following existing disturbance would cause greater impacts on resources, including fragmentation and spread of noxious weeds, than an alternate route to minimize disturbance. Reducing these disturbances would reduce impacts on wetlands and riparian areas, including unmitigated loss. This is because pipelines that might otherwise have been routed through these areas could be rerouted to follow existing roads.

Impacts Common to All BLM Action Alternatives

Prohibiting gathering and cutting of woody species in riparian zones would reduce erosion impacts in these areas by preserving vegetation with roots to stabilize the soil. Development of additional site-specific mitigation measures and COAs (**Appendix C**) under all BLM action alternatives would further reduce impacts on riparian areas and wetlands.

BLM No Action Alternative

Vegetation Management

Vegetation would be managed in accordance with existing laws and policies. Generally, vegetation treatments would result in short-term wetland and riparian vegetation loss and movement away from PFC; however, they would also result in long-term maintenance of wetland and riparian vegetation and movement toward PFC. Vegetation treatments would not be prioritized by GMU-specific objectives under the BLM No Action Alternative.

The BLM No Action Alternative would not close riparian zones (including seeps and springs) to gathering of native species and would manage vegetation in accordance with existing laws and policies. Generally, vegetation treatments would result in short-term wetland and riparian vegetation loss and movement away from PFC; however, they would also result in long-term maintenance of wetland and riparian vegetation and movement toward PFC. The removal of nonnative woody species would continue under the BLM No Action Alternative and continue to improve these areas by moving them toward historical conditions and PFC. Weed and invasive management under the BLM No Action Alternative would be as described under *Impacts Common to All BLM Alternatives*.

Lands with Wilderness Characteristics

The BLM would not manage lands to protect wilderness characteristics as a priority over other multiple uses. Riparian areas in these areas that are outside of the Ephemeral Wash Riparian Area SDA or the delineated boundary of wetlands could continue to be affected by surface-disturbing activities.

Lands and Realty

ROW avoidance and exclusion areas would be determined on a case-by-case basis (see **Table 3-22**). In areas managed as ROW exclusion or avoidance, impacts of surface disturbance on riparian areas and wetlands would be reduced.

**Table 3-22
ROW Management in Riparian Areas and Wetlands**

Lease	BLM No Action Alternative	BLM Alternative A	BLM Alternative B ¹	BLM Alternative C ²	BLM Alternative D
ROW Open	Case-by-case	1,600	4,900	0	0
ROW Avoidance	Case-by-case	23,100	20,000	0	0
ROW Exclusion	Case-by-case	300	200	25,000	25,000

Source: BLM GIS 2019

¹ Includes BLM Sub-Alternatives B1 and B2

² Includes BLM Sub-Alternatives C1 through C6

Fluid Minerals

Under the BLM No Action Alternative, approximately 23,200 acres of riparian areas and wetlands on BLM-managed surface land would continue to be open to fluid mineral leasing, as shown in **Table 3-23**. In these leasing areas, riparian and wetland areas could be affected by development of well pads, roads, power lines, and other infrastructure, although operations would not be allowed in the actual riparian and wetland areas.

Only 140 of the 23,200 acres would be open with standard terms and conditions. Even in these areas, no wells would be placed in floodplains, wetlands, or riparian areas pursuant to Onshore Order I, part IV (c), which prohibits operations “in areas subject to mass soil movement, riparian areas, floodplains, lakeshores, and/or wetlands” unless approved in a Surface Use Plan of Operations. The remaining open areas would be subject to NSO, CSU, or TL stipulations, with the potential of being under multiple stipulations. Wetlands and riparian areas subject to NSO stipulations could have reduced impacts from development, as surface disturbance would be prohibited and the risk of spills and water contamination would be reduced. Under

Table 3-23
Fluid Mineral Leasing Allocations in Riparian Areas and Wetlands on BLM-Managed Surface Land

Lease	BLM No Action Alternative	BLM Alternative A	BLM Alternative B ¹	BLM Alternative C ²	BLM Alternative D
Closed to Leasing	1,200	6,700	-	-	1,200
Open to Leasing	23,200	17,700	-	-	23,200
Open to Leasing, Subject to Standard Terms and Conditions	140	0	-	-	3,900
Open to Leasing, Subject to TLs	3,700	5,600	-	-	0
Open to Leasing, Subject to CSU Stipulations	19,100	7,600	-	-	18,900
Open to Leasing, Subject to NSO Stipulations	22,400	17,700	-	-	1,400

Source: BLM GIS 2019

¹For BLM Sub-Alternatives B1 and B2, see **Table 3-24**

²For BLM Sub-Alternatives C1 through C6, see **Table 3-25**

the BLM No Action Alternative, the highest acreage of riparian areas and wetlands would be subject to NSO stipulations, compared with other alternatives. CSU stipulations would also reduce impacts where they reduce surface disturbance.

The BLM would continue to apply an NSO stipulation on 100-year floodplains in the Ephemeral Wash Riparian Area SDA. Additionally, wetlands would continue to be subject to NSO stipulations, which would reduce impacts on riparian areas and wetlands by preventing loss of function. Under this alternative, the BLM would also continue to apply a CSU stipulation within the 100-year floodplain. These surface occupancy restrictions would protect riparian systems and facilitate attainment and maintenance of PFC. Research, however, has shown that upland habitats adjacent to wetlands are critical to the survival of wetland-dependent wildlife (Boyd 2001); therefore, surface disturbance adjacent to delineated wetlands and the 100-year floodplain could continue to affect the ecological health of those areas.

Through the process of hydraulic fracturing, returned water contains a mix of injection fluid and brine from within the rock strata (Sutter et al. 2015). If this fluid is not properly collected and treated, it can contaminate aquatic resources (Sutter et al. 2015). The brine in hydraulic fracturing fluid is high in chloride; chloride concentrations have been found to be the cause of contamination in many wetlands throughout the prairie pothole region of the United States (Post Van der Burg and Tangen 2015).

Additionally, hydraulic fracturing requires millions of gallons of water, and these water withdrawals may stress wetlands and riparian systems by further depleting local water resources (Sutter 2015). As a result, riparian and wetland areas could decrease condition and move away from PFC, and riparian and wetland vegetation could die or suffer reduced vigor.

BLM Alternative A

Vegetation Management

The BLM would manage vegetation for FFO-VCC 2 (see **Appendix G**). The trend would be stationary/static or upward/improving. In riparian areas, ratings would be in PFC. Managing vegetation with PFC in mind and upward or improving as a trend goal would help wetlands and riparian areas maintain or move toward PFC.

The BLM would prioritize vegetation treatments by GMU to maintain or improve vegetation communities to accommodate their unique habitat goals. More information on GMUs can be found in **Figure 2-1**, BLM Alternative A: Vegetation Treatments. Under BLM Alternative A, approximately 6,800 acres of wetlands and 1,700 acres of riparian areas in GMUs would be priority level I for treatments. Maintaining and improving these communities could help achieve and maintain PFC.

Gathering and cutting native woody species in all riparian zones, including seeps and springs, would be prohibited under BLM Alternative A. This restriction would help reduce alteration of physical characteristics of riparian and wetland areas, helping them to continue to meet BLM resource objectives by sustaining PFC.

Lands with Wilderness Characteristics

The BLM would manage 24,300 acres of lands to protect wilderness characteristics as a priority over other multiple uses. Riparian areas in these areas that are outside of the Ephemeral Wash Riparian Area SDA or the delineated boundary of wetlands would receive indirect protection from surface-disturbing activities, thereby reducing the potential for impacts on riparian areas and wetlands within the boundaries of Units 069, 075, and 082.

Riparian areas and wetlands within lands managed to protect wilderness characteristics as a priority over other multiple use would receive further protection from restrictive management of these areas. This is because surface disturbance would not be permitted. Surface disturbance prohibition within 150 feet of riparian areas and wetlands from NSO stipulations and ROW avoidance would be extended to adjacent vegetation communities with wetland-dependent species in lands managed to protect wilderness characteristics.

Lands and Realty

The BLM would manage all but 1,600 acres of wetlands and riparian areas on BLM-managed surface lands as ROW avoidance or exclusion, as shown in **Table 3-22**. Areas managed as ROW avoidance or ROW exclusion would have significantly fewer impacts from surface disturbance than those open to ROW authorizations. Riparian areas and wetlands within lands managed to protect wilderness characteristics as a priority over other multiple use would not be affected by the restrictions on development of these lands. This is because the riparian areas and wetlands would already be protected from surface disturbance by the NSO stipulations and ROW avoidance management.

Fluid Minerals

Approximately 17,700 acres of wetlands and riparian areas on BLM-managed surface land would be open to fluid mineral leasing under BLM Alternative A, as shown in **Table 3-23**. However, all open areas would be subject to NSO stipulations, which would prevent impacts from surface disturbance in wetlands and riparian areas. Subsurface impacts, such as those from hydraulic fracturing described under *BLM No Action Alternative*, may still occur.

BLM Alternative A would apply NSO stipulations in known and newly discovered natural seeps and springs and extending to 656 feet (200 meters) beyond the ordinary high-water mark of these seeps and springs. If directional drilling is prohibited in these areas, this may add protections for water quality beneath seeps and springs by reducing the risk of communication between natural gas formations or fractures and groundwater. Impacts on water quality would directly affect riparian and wetland quality. Additionally, under its Alternative A, the BLM would prohibit surface occupancy in the riparian system active channel, 100-year floodplain, and 656-foot (200-meter) zone around Ephemeral Wash Riparian Area SDA and wetlands and seeps/springs. Surface occupancy would also be prohibited in wetlands and seeps/springs within 656 feet (200 meters) of the ordinary high-water mark or the boundary of the wetland. Protection of these upland areas adjacent to riparian areas and wetlands would reduce displacement of wetland-dependent wildlife from surface disturbance, thus allowing for increased ecological function of these areas. This would also facilitate attainment and maintenance of PFC within riparian areas and wetlands.

BLM Alternative B (Includes BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

Vegetation Treatments

The BLM would manage vegetation for FFO-VCC I (see **Appendix G**). The trend would be stationary/static or upward/improving. In riparian areas, the priority would be achieving PFC in all reaches and wetlands. Managing vegetation with PFC in mind and upward or improving as a trend goal would help wetlands and riparian areas maintain or move toward PFC.

Vegetation treatments under BLM Alternative B would prioritize improving or maintaining soil stability and the landscape’s unique aesthetics. Treatments would be designed according to the different vegetation communities in the GMU to accommodate unique habitat management goals. More information on GMUs can be found in **Figure 2-2**, BLM Alternative B: Vegetation Treatments. Under BLM Alternative B, approximately 4,100 acres of wetlands and 900 acres of riparian areas in GMUs would be priority level I for treatments. The attempt to maintain soil stability in these areas under BLM Alternative B would reduce erosion that can destabilize wetland and riparian habitat.

As under BLM Alternative A, riparian areas would be closed to firewood gathering and cutting under BLM Alternative B, with the same impacts.

Lands with Wilderness Characteristics

Riparian areas and wetlands within lands managed to protect wilderness characteristics as a priority over other multiple use would receive further protection from restrictive management of these areas. This is because surface disturbance would not be permitted. Surface disturbance prohibition within 150 feet of riparian areas and wetlands from NSO stipulations and ROW avoidance would be extended to adjacent vegetation communities with wetland-dependent species in lands managed to protect wilderness characteristics as a priority over other multiple uses.

Lands and Realty

Under BLM Alternative B, approximately 4,900 acres of wetlands and riparian areas on BLM-managed surface lands would be open to ROW authorizations. Approximately 20,000 acres would be managed as ROW avoidance and 200 acres as ROW exclusion, as seen in **Table 3-22**. This management would reduce impacts on wetlands and riparian areas from surface disturbance associated with ROW construction compared with the BLM No Action Alternative.

Fluid Minerals

BLM Sub-Alternatives B1 and B2

Approximately 16,500 acres of wetlands and riparian areas would be open to fluid mineral leasing under BLM Alternative B1, as shown in **Table 3-24**. However, all open areas would be subject to NSO stipulations, which would prevent impacts from surface disturbance in wetlands and riparian areas. Subsurface impacts, such as those from hydraulic fracturing described under *BLM No Action Alternative*, may still occur.

**Table 3-24
Fluid Mineral Leasing Allocations in Wetlands and Riparian Areas on BLM-Managed Surface Land – Sub-Alternatives B1 and B2**

Leasing Allocation	BLM Sub-Alternative B1	BLM Sub-Alternative B2
Closed to Leasing	7,900	8,700
Open to Leasing	16,500	15,700
Open to Leasing, Subject to Standard Terms and Conditions	0	0
Open to Leasing, Subject to TLs	1,900	1,800
Open to Leasing, Subject to CSU Stipulations	8,200	7,800
Open to Leasing, Subject to NSO Stipulations	16,500	15,700

Source: BLM GIS 2019

Under BLM Alternative B2, 15,700 acres of wetland and riparian areas on BLM-managed surface land would be open to fluid mineral leasing, as shown in **Table 3-24**. However, all open areas would be subject to NSO stipulations, which would prevent impacts from surface disturbance in wetlands.

The BLM would manage out to 150 feet beyond the active channel, 100-year floodplain, riparian system (including the Ephemeral Wash Riparian Area SDA), wetlands, and seeps/springs with an NSO stipulation. Beyond this NSO stipulation, a CSU stipulation would reduce impacts of spills and erosion out to 650 feet beyond these areas but would still allow surface disturbance. Application of NSO and CSU stipulations would reduce development and decrease the likelihood to move away from PFC, as well as decrease unmitigated loss. Because surface disturbance would still be allowed in some areas within 656 feet of riparian areas and wetlands, wildlife species dependent on wetland habitat could be displaced. This would affect the health of the wetland community (Boyd 2001). These impacts would be mitigated where the BLM uses COAs to relocate oil and gas facilities up to 656 feet away from these resources to avoid impacting them. Overall, impacts from oil and gas development on riparian areas and wetlands would decrease, compared with the BLM No Action Alternative.

BLM Alternative C (Includes BLM Sub-Alternatives C1–C6; applying only to Fluid Minerals)

Vegetation Management

The BLM would manage vegetation communities for FFO-VCC 3. The trend would be stationary/static or upward/improving. PFC ratings would be managed as FAR at a minimum, but with the ultimate goal to achieve PFC. Vegetation treatments in GMUs would have the objective of prioritizing and enhancing traditional and historical use of vegetation. Actions would include controlling weeds and soil stability. More information on GMUs can be found in **Figure 2-3**, BLM Alternatives C and D: Vegetation Treatments. Under BLM Alternative C, approximately 20,800 acres of wetlands and 3,800 acres of riparian areas in GMUs would be priority level I for treatments. These treatments could reduce soil erosion and invasive weeds in wetland and riparian habitat.

As under BLM Alternative A, riparian areas would be closed to firewood gathering and cutting under BLM Alternative C, with the same impacts.

Lands with Wilderness Characteristics

As under the BLM No Action Alternative, management of lands with wilderness characteristics would not change impacts on riparian areas and wetlands.

Lands and Realty

Under BLM Alternative C, approximately 25,000 acres of wetlands and riparian areas on BLM-managed surface lands would be open to ROW authorizations, as seen in **Table 3-22**. Other ROW avoidance areas would all help prevent impacts on riparian areas and wetlands even though such ROW restrictions would not specifically be intended to protect riparian and wetland areas. Nevertheless, where an overlap occurred between these resources and areas with these ROW restrictions, surface disturbance impacts on riparian and wetland areas would be reduced. Although there would be no ROW restrictions specifically to protect riparian areas and wetlands, impacts of surface disturbance in these areas would be mitigated where the BLM uses its discretion to relocate proposed ROWs to avoid them.

Fluid Minerals

BLM Sub-Alternatives C1 to C6

Approximately 23,200 acres of riparian areas and wetlands on BLM-managed surface land would be open to fluid mineral leasing under BLM Alternatives C1 through C5, and 23,100 acres under Alternative C6, as shown in **Table 3-25**. In these leasing areas, riparian areas and wetlands could be affected by development of well pads, roads, power lines, and other infrastructure, although operations would not be allowed in the actual riparian areas and wetlands per Onshore Order 1, as described under *BLM No Action Alternative*. NSO stipulations would prevent impacts from surface disturbance in some riparian areas and wetlands, varying

from 2,600 acres under BLM Alternative C1 to 3,500 acres under BLM Alternative C5 (see **Table 3-25**). Some open wetlands or riparian areas would also be subject to CSU or TL stipulations, which may overlap. These stipulations would reduce impacts on riparian areas and wetlands as described under *BLM No Action Alternative*.

**Table 3-25
Fluid Mineral Leasing Allocations in Wetlands and Riparian Areas on BLM-Managed Surface Land – Sub-Alternatives C1 through C6**

Leasing Allocation	BLM Sub-Alternative C1	BLM Sub-Alternative C2	BLM Sub-Alternative C3	BLM Sub-Alternative C4	BLM Sub-Alternative C5	BLM Sub-Alternative C6
Closed to Leasing	1,200	1,200	1,200	1,200	1,200	1,300
Open to Leasing	23,200	23,200	23,200	23,200	23,200	23,100
Open to Leasing, Subject to Standard Terms and Conditions	7,700	7,600	7,500	7,300	7,000	1,500
Open to Leasing, Subject to TLs	3,700	3,700	3,700	3,700	3,700	3,700
Open to Leasing, Subject to CSU Stipulations	14,900	14,900	14,900	14,900	14,900	14,900
Open to Leasing, Subject to NSO Stipulations	2,600	2,700	2,800	3,100	3,500	2,700

Source: BLM GIS 2019

BLM Alternative D

Vegetation Management

The BLM would manage vegetation communities for FFO-VCC 3, as described under BLM Alternative C. GMU vegetation treatments under Alternative D would prioritize improving weed management and improving or maintaining soil stability. This would be intended to mitigate this increased resource use. Like Alternative C, under BLM Alternative D, approximately 20,800 acres of wetlands and 3,800 acres of riparian areas in GMUs would be priority level I for treatments. These actions would cause impacts similar to those described under BLM Alternatives B and C.

As under BLM Alternative A, riparian areas would be closed to firewood gathering and cutting under BLM Alternative D, with the same impacts.

Lands with Wilderness Characteristics

As under the BLM No Action Alternative, management of lands with wilderness characteristics would not change impacts on riparian areas and wetlands.

Lands and Realty

Approximately 25,000 acres of riparian areas and wetlands would be open to ROW authorizations, as seen in **Table 3-22**. As under BLM Alternative C, other ROW restrictions under this alternative would help prevent impacts on riparian areas and wetland. Thus, even though there would be no ROW restrictions specifically to protect riparian areas and wetlands, impacts of surface disturbance in these areas would be mitigated where the BLM uses its discretion to relocate proposed ROWs to avoid them.

Fluid Minerals

Like under the BLM No Action Alternative, approximately 23,200 acres of riparian areas and wetlands would be open to fluid mineral leasing under BLM Alternative D, as shown in **Table 3-23**. In these areas, riparian areas and wetlands could be affected by developing well pads, roads, power lines, and other infrastructure,

although operations would not be allowed in the actual riparian areas and wetlands per Onshore Order 1, as described under *BLM No Action Alternative*.

Under BLM Alternative D, 3,900 acres would be open to leasing subject to standard terms and conditions. In these areas, impacts on riparian and wetland habitat from oil and gas development would be the greatest. All other open areas would be subject to NSO, CSU, or TL stipulations, with the potential of being under multiple stipulations. Impacts would be reduced as a result of these stipulations. These stipulations would all represent indirect impacts on riparian areas and wetlands because the stipulations would not specifically be intended to protect riparian areas and wetlands. Nevertheless, where an overlap occurred between these resources and areas with these stipulations, surface disturbance impacts on riparian areas and wetlands would be reduced. Although there would not be any stipulations specifically restricting activity in riparian areas and wetlands in the BLM surface decision area, impacts would be avoided where the BLM uses COAs to relocate oil and gas facilities up to 656 feet away from these resources, as described under *Impacts Common to All Alternatives*.

BIA Alternatives

Impacts Common to All BIA Alternatives

Vehicular access to well sites would be limited to approved access roads under all BIA alternatives. Restricting fluid mineral ROW access would minimize surface disturbance impacts on riparian areas and wetlands. Under all BIA alternatives, access roads would be managed to prevent erosion. Maintaining roads would reduce erosion and sediment impacts.

Under all BIA alternatives, the BIA would restrict the lessees' use of water by ensuring Navajo Nation grazing and water rights would be unimpaired. Restricting water for leasing would reduce depletion of local water resources, thereby reducing impacts on wetland and riparian vegetation (Sutter 2015).

Under all BIA alternatives, the projected surface disturbance from new wells in the BIA mineral decision area (see **Table 3-1**) could affect riparian areas and wetlands whenever disturbance occurred near those resources. Surface disturbance would result in the impacts described under *BLM No Action Alternative*.

Before entry on the land or the disturbance of the surface thereof for drilling or other purposes, a lessee would continue to submit a development plan for the surface use to the area manager. When such entry or disturbance occurs on Indian allotted lands, the BLM would conduct an environmental analysis, in consultation with the BIA, ensuring proper protection of the surface, natural resources, and the environmental and existing improvements. This consultation would have the potential of minimizing impacts.

During its review of APDs in the BIA mineral decision area, the BLM could use COAs to relocate oil and gas facilities up to 656 feet outside of riparian areas and wetlands to avoid impacts on those resources from surface disturbance and spills.

BIA No Action Alternative

Unique to the BIA No Action Alternative is the restriction that the lessee not drill within 500 feet of any reservoir, live stream, or other body of water without written consent of the Navajo Nation Minerals Department and the Water Code Administration. This restriction can help to distance development from riparian areas and wetlands, minimizing impacts.

BIA Alternative A

Lessees would be required to avoid unnecessary damage to vegetation, control soil erosion, and prevent soil and water pollution. Protecting these resources would minimize impacts on wetland and riparian communities. They would not be able to use any waters of the Navajo Nation without a water use permit. With water limitations, drilling would be limited, protecting wetlands and riparian areas.

Impacts on wetlands and riparian areas would be reduced under BIA Alternative A, compared with the BIA No Action Alternative, whenever roads, utilities, and pipelines share common ROWs. BIA Alternative A

would require the reestablishment of local native vegetation in areas of disturbance. This would reduce long-term impacts on riparian vegetation. There is no similar action in the BIA No Action Alternative.

BIA Alternative B

All actions affecting riparian areas and wetlands described under BIA Alternative A would also apply to BIA Alternative B. Additionally, BIA Alternative B would require directional drilling in some areas to hide proposed well locations from culturally sensitive viewpoints. Overlap of these viewpoints with wetlands and riparian areas would protect these areas from surface disturbance.

BIA Alternative C

Impacts on riparian areas and wetlands would be the same as those described under BIA Alternative A.

BIA Alternative D

Impacts on riparian areas and wetlands would be the same as those described under BIA Alternative A.

Cumulative Impacts

The cumulative impact analysis area for riparian areas and wetlands follows fourth-order watershed boundaries that completely or partially overlap the planning area. This is because indirect impacts, such as increased dust from such activities as mineral development or recreation, could affect wetlands and riparian areas outside the planning area. The fourth-order watersheds were used as the basic unit of analysis because the scope of cumulative influence would be at the watershed scale and is not expected to extend beyond this scale.

Noxious weeds can also be dispersed into the planning area by upstream waterways and carried downstream from the planning area.

Past, present, and reasonably foreseeable future actions in the cumulative impact analysis area that have affected and will continue to affect riparian areas and wetlands are as follows:

- Oil and gas development
- Agriculture and livestock grazing
- Other surface development, such as road and housing development
- Vegetation management plans

Generally, impacts on wetlands and riparian areas from these actions occur due to loss or modification of vegetation communities, altered species composition and vegetation structure, establishment and spread of noxious weeds, and soil disturbance, including compaction, erosion, topsoil removal, loss of native seed banks, and changes in water quality or availability.

On BLM-managed lands, measures from the 2000 Aquatic and Riparian Habitat Management Plan (BLM 2000) have also affected and will continue to affect vegetation in the planning area. This plan reduces impacts on riparian vegetation by maintaining acres and the condition of vegetation and wetlands and by reducing weed establishment and spread through BLM management.

For wetlands and riparian areas, the incremental contribution from each alternative to cumulative effects on riparian areas and wetlands are similar to those for upland vegetation (**Section 3.4.5**) and water resources (**Section 3.4.3**). Federal and state agency actions would generally consider and mitigate impacts on riparian areas and wetlands, and cumulative effects would be minimized. Actions on private lands may not receive such analysis and are more likely to contribute to cumulative effects.

Under the FMG RMPA/EIS, impacts on wetlands and riparian areas from resource use and development would be minimized to the extent practical and feasible through restrictions, stipulations, closures to mineral exploration and development, application of COAs, and concentrating development in previously disturbed areas. Wetland and riparian conditions would be improved through vegetation treatments, weed prevention

and control, habitat improvements, prescribed and wildland fire use, forestry management, and proper grazing practices.

In general, all alternatives would work toward enhancing or maintaining the resiliency of the land but would differ in the time and methods used to reach that goal. The BLM and BIA No Action Alternatives would make the least progress, compared with the action alternatives. This is because there are no specific wetland and riparian goals or restrictions on development under these alternatives.

The contribution to cumulative impacts on riparian areas and wetlands under BLM and BIA Alternative A would be lower than under the BLM and BIA No Action Alternatives, due to an emphasis on enhancing ecological systems and maintaining or improving the resiliency of ecosystems. BLM Alternative A would have a higher number of wetland and riparian acres closed to fluid mineral leasing and exploration and would have NSO stipulations targeted at protecting these areas. BLM Alternative A would also manage areas as ROW exclusion and avoidance to further minimize impacts. This could reduce the contribution to cumulative impacts from development compared with the BLM No Action Alternative's case-by-case ROW determinations.

Relative to the BLM and BIA No Action Alternatives, the contribution to cumulative impacts on riparian areas and wetlands under BLM and BIA Alternative B would be lower. This would be due to an emphasis on enhancing the unique landscapes, while sustaining and increasing native vegetation communities and at the same time protecting cultural resources. BLM Alternative B would have the most acres of riparian and wetland habitat closed to leasing, as well as NSO stipulations targeted at protecting these areas. BLM Alternative B would also manage areas as ROW exclusion and avoidance to further minimize impacts.

Under BLM and BIA Alternatives C and D, more acres of wetlands or riparian areas would be open to fluid mineral leasing subject to standard terms and conditions compared with the BLM and BIA No Action Alternatives. The contribution to cumulative impacts on riparian areas and wetlands would be similar to that under the BLM and BIA No Action Alternatives, except that BLM and BIA vegetation management requirements would mitigate impacts.

3.4.5 Upland Vegetation and Soils

Affected Environment

Current Conditions

The analysis area is in portions of three EPA level III ecoregions: Colorado Plateau, Arizona/New Mexico Plateau, and Southern Rockies (EPA 2011). More information can be found in the EPA report on Level III Ecoregions of the Continental United States, revised December 2011.

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has done soil surveys for the planning area and has classified the soils into over 700 map units. These units consist of associations of different major soil series found in the NRCS soil survey data. Additionally, there are miscellaneous areas that have little or no soil material, such as rock outcrops, and thus support scant or no vegetation. Soil information and classification data cover approximately 88 percent of the decision area. The FFO has also created a fragile soil and weeds dataset; data on microbial soil crust for a portion of the planning area were obtained from the Colorado Plateau Rapid Ecoregional Assessment. The characteristics and distribution of soil types in the planning area affect the use and management of the land and the quality of the surface water, air, forage, and vegetation growth.

Fragile Soils

There are 561,700 acres of fragile soils in the BLM and BIA surface decision areas (see **Figure 3-10**, Fragile Soils). When the BLM FFO identifies potentially fragile soils under its jurisdiction, it may recommend maintaining soil integrity.

Fragile soils may have the following characteristics:

- Being susceptible to wind or water erosion
- Occurring on steep slopes, making them more susceptible to erosion
- Containing microbial crusts
- Being susceptible to weed invasion

Factors that influence soil erosion are soil texture, soil structure, length and percent of slope, vegetation cover, and rainfall or wind intensity. Soils most susceptible to erosion by wind or water are typified by bare or sparse vegetation cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Wind erosion processes are less affected by slope angles but are highly influenced by wind intensity.

Soils are prone to natural degradation when surface litter and horizons are removed by erosion in excess of the potential for soil to be rebuilt through deposition. Wind erosion is particularly a hazard when surface disturbance, biological crusts, and vegetation are removed.

Uplands in the decision area tend to have steep slopes, drainage densities, relief, and ruggedness, which may increase erosion rates. When coupled with the climate patterns in the planning area, which include intense rainfall, these characteristics can lead to high sediment loads and runoff rates during storms.

Some soils are covered with microbiotic soil crusts, which are also important indicators of rangeland health (Belnap et al. 2001; Butler et al. 2003; Johansen et al. 1984). This is because they appear to be more sensitive than plants to disturbance from wildfire, livestock grazing, and off-highway vehicle (OHV) activity.

Microbiotic soil crusts are made up of tiny living plants and bacteria that grow together on the surface. They help keep the soil from washing or blowing away, fix nitrogen from the atmosphere into the soil, help resist weed invasion, and promote the resiliency of plant communities. In areas where microbiotic soil crusts have been lost, there is a greater risk of annual grass or other invasive plants becoming established, which can alter erosion patterns.

Plant Communities

Public lands in San Juan, McKinley, Rio Arriba, and Sandoval Counties support a diversity of upland and riparian plant communities (**Figure 3-11**, Vegetation Communities). These plant communities or vegetation types are controlled in large part by site-specific topography, soil type, and climatic conditions.

The BLM and BIA surface decision areas contain nine FFO-defined broad-scale plant community types (**Appendix G**). The BLM derived the nine vegetation communities from the combination of Southwest Regional Gap Analysis Project (SWReGAP) data and NRCS ESDs. These vegetation communities are pinyon-juniper, sagebrush grassland, grassland, badlands, saltbush/shadscale/winterfat, greasewood, riparian, oak woodlands, and ponderosa pine-mixed conifer. Vegetation communities are further described in **Appendix G**. Each community description includes the ESDs and soils, indicators and importance of this community, and threats to this community. The riparian community is described in detail in **Section 3.4.4**, Riparian Areas and Wetlands.

Game Management Units

The New Mexico Department of Game and Fish has established six game management units (GMUs) to manage big game hunting in the planning area. These GMUs vary in their priority for the management of general or trophy big game hunting. The BLM FFO is using these GMUs to assist in prioritizing wildlife habitat improvement treatments. The FFO is using five GMUs to prioritize treatments per **Table 2-2**, page 2-20. One of the five is “GMU 5,” which is a naming convention created as a combination of the portions of GMU 5A, 5B, and 6A within the planning area. These GMUs, and how they would be managed under each action alternative in terms of vegetation treatments, are shown in **Figures 2-1 to 2-4**, **Appendix A**.

Traditional Plant Uses

EO 13007, Indian Sacred Sites (May 24, 1996) directs federal agencies to manage federal lands in a manner that accommodates Indian religious practitioners’ access to and ceremonial use of sacred sites. The agencies

also must avoid adversely affecting the physical integrity of such sacred sites, to the extent practicable, as permitted by law, and not clearly inconsistent with essential agency functions. The EO “is intended only to improve the internal management of the executive branch and is not intended to, nor does it, create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by any party against the United States, its agencies, officers, or any person.” Plant gathering (typically by hand and in small amounts) of grasses, shrubs, and forbs for medicinal, ceremonial, and other uses at CIMPPs is allowed, as described in **Section 3.4.9**, Cultural Resources.

Trends

Vegetation communities in the surface decision area have been affected over the past 60 years by the following:

- Oil and gas development and its associated roads and other rights-of-way
- Introduction of noxious weeds, such as cheatgrass, Russian knapweed, and halogeton
- Conversion from urbanization and rural home development
- Intensive agriculture
- Expanding OHV use
- Grazing
- Vegetation treatments

Fragmentation occurs to varying levels across the surface decision areas, but much of the surface decision areas nearer to urban areas are extremely fragmented due to increased development. This extreme fragmentation should continue to prevent larger fires from becoming common. However, fragmentation also changes vegetation communities and reduces plant and wildlife habitat.

Development of fluid and non-fluid mineral resources places a major demand on soils in the decision area. Extracting minerals generally disturbs the surface, and impacts on soil and vegetation resources can be long term. Disturbance is associated with such activities as pipeline installation, power line construction, seismic exploration, exploratory drilling and mining. For BLM-authorized actions, disturbed areas require reclamation, and soil stability recommendations are implemented in areas with identified fragile soils or where needed.

Soils can be affected by changes in vegetation. Heavy grazing in the nineteenth and early twentieth centuries, coupled with the suppression of natural fires, facilitated conditions that favor shrub dominance in the sagebrush grasslands.

LANDFIRE Vegetation Condition Classes

The three LANDFIRE VCC classes in the planning area are based on low (VCC I), moderate (VCC II), and high (VCC III) departures from the central tendency of the historical regime. These classes indicate the general level to which current vegetation is different from the simulated historical vegetation reference conditions. Low departure is within the historical range of variability, while moderate and high departures are outside it. This departure results in changes to one (or more) of the following ecological components: vegetation characteristics (e.g., species composition, structural stages, canopy closure, and fuel loading); fuel composition; fire frequency, severity, and pattern; and other associated disturbance (e.g., grazing and drought). The LANDFIRE VCC data are dynamic and are periodically updated.

Environmental Consequences

BLM Alternatives

Impacts Common to All BLM Alternatives

For vegetation and soil management, projects will provide interim and final reclamation. This would minimize opportunities for water and wind to erode bare soil, which would maintain soil and vegetation resiliency.

BLM No Action Alternative

Vegetation Management

The BLM would continue to use current vegetation management methods and conduct vegetation treatments under its No Action Alternative; however, vegetation treatments would not be prioritized by GMU-specific objectives under the No Action Alternative. FFO-VCCs would not be defined and used in management under this alternative.

Mechanical or surface-disturbing vegetation treatments could continue to expose soil to wind and water erosion in the short term but would enhance soil conditions in the long term by improving vegetation conditions.

Lands with Wilderness Characteristics

Vegetation and soils in lands with wilderness characteristics would not receive any special management; therefore, they would continue to be impacted by development in the same manner as vegetation and soils in the rest of the BLM surface decision area.

Fluid Minerals and Lands and Realty

Additional surface disturbance from oil and gas development in the BLM mineral decision area would continue to occur, as projected in **Table 3-1**, RFD Projections by Alternative. Further, as noted in **Section 3.4.4**, Riparian Areas and Wetlands, returned water from hydraulic fracturing, if not properly collected and treated, can contaminate aquatic resources (Sutter et al. 2015) and damage other natural resources in the area. In an experimental forest in 2011, vegetation sprayed with hydraulic fracturing fluid resulted in severe damage and high mortality rates (Adams 2011). Management actions that close areas to fluid mineral leasing, establish NSO stipulations for fluid minerals, and establish ROW exclusion areas would continue to prevent surface disturbances that can cause destruction of vegetation and soil compaction and wind and water erosion. Management actions that establish CSU stipulations for fluid minerals and establish ROW avoidance areas would continue to minimize these disturbances. These actions would generally indirectly reduce impacts on vegetation and soil resources because the actions would not specifically be intended to protect these resources. Nevertheless, where an overlap occurred between these resources and areas with these management actions, surface disturbances that cause disturbance to vegetation and soil compaction would continue to be reduced. CSU stipulations would continue to have the greatest influence on upland vegetation and soil conditions under the BLM No Action Alternative.

Areas subject to different oil and gas and ROW management actions overlap areas with fragile soils in **Table 3-26** and **Table 3-27**. Most fragile soils in the BLM surface and mineral decision areas would continue to be subject to CSU stipulations for other resources, which could indirectly reduce erosion and compaction impacts from oil and gas development. However, these impacts could continue to occur on fragile soils in the BLM surface and mineral decision area. Surface disturbance from ROW development could also continue to impact fragile soils if the BLM did not use its discretion to locate ROWs away from them.

The CSU stipulation prohibiting disturbance on steep slopes would continue to directly reduce erosion and disturbance of vegetation on these slopes. However, ROW development could still result in these impacts if the BLM did not use its discretion to locate ROWs away from steep slopes.

**Table 3-26
Oil and Gas Management on Fragile Soils in BLM Mineral and BLM Surface Decision Areas, BLM No Action Alternative**

Leasing Allocation	BLM No Action Alternative				
	Acres	Percentage of Total Fragile Soils in BLM Mineral	Percentage of Total Fragile Soils in BLM Surface	Percentage of BLM Mineral	Percentage of BLM Surface
Closed to Fluid Mineral Leasing - BLM Mineral	58,600	12%	N/A	3%	N/A
Closed to Fluid Mineral Leasing - Only BLM Surface	57,300	12%	14%	3%	4%
Fluid Minerals with CSU Stipulations - BLM Mineral	338,400	72%	N/A	17%	N/A
Fluid Minerals with CSU Stipulations - Only BLM Surface	285,300	61%	70%	14%	22%
Fluid Minerals with NSO Stipulations - BLM Mineral	21,900	5%	N/A	1%	N/A
Fluid Minerals with NSO Stipulations - Only BLM Surface	19,900	4%	5%	1%	2%

Source: BLM GIS 2019

Notes

Total fragile soils in BLM mineral (acres) 469,900
Total fragile soils in BLM surface (acres) 410,100
 BLM mineral (acres) 1,982,100
 BLM surface (acres) 1,316,200

**Table 3-27
ROW Management on Fragile Soils in BLM Mineral and BLM Surface Decision Areas by Alternative**

ROW Allocation	BLM No Action Alternative			BLM Alternative A			BLM Alternative B			BLM Alternative C			BLM Alternative D		
	Acres	Percentage of Total Fragile Soils in BLM Surface	Percentage of BLM Surface	Acres	Percentage of total Fragile Soils in BLM Surface	Percentage of BLM Surface	Acres	Percentage of Total Fragile Soils in BLM Surface	Percentage of BLM Surface	Acres	Percentage of Total Fragile Soils in BLM Surface	Percentage of BLM Surface	Acres	Percentage of Total Fragile Soils in BLM Surface	Percentage of BLM Surface
ROW Exclusion	0	0%	0%	9,100	2%	1%	7,200	2%	1%	2,100	1%	<1%	2,100	1%	<1%
ROW Avoidance	0	0%	0%	381,300	93%	29%	376,800	92%	29%	2,100	0%	0	2,100	0%	0%
Open for ROW Location	N/A	N/A	N/A	19,700	5%	2%	26,100	6%	2%	405,900	99%	31%	405,900	99%	31%

Source: BLM GIS 2019

Notes: ROW corridors are not included in these calculations of ROW avoidance and exclusion designations.

Total fragile soils in BLM surface (acres) 410,100

BLM planning area surface (acres) 1,316,200

Impacts Common to All BLM Action Alternatives

FFO-VCCs

The BLM defined four FFO-VCCs to describe the current condition of the vegetation communities. The highest condition of a specific vegetation community would represent Class 1, and Classes 2–4 represent departures from FFO-VCC 1 conditions. The FFO-VCCs are based on a combination of many factors that vary within vegetation communities, including the following:

- ESDs and HCPC, and reference states
- Habitats for threatened, endangered, and listed species managed to provide for recovery and move species toward delisting
- Range condition
- Rangeland health assessments
- Wildlife habitat and obligate species that occupy the habitat, including migratory bird nesting habitat
- LANDFIRE condition class
- Vegetation age class
- Nonnative, invasive and noxious species (weeds) presence
- PFC categories for riparian areas and wetlands

BLM Alternative A

Vegetation Management

Vegetation treatments in GMUs would prioritize maintaining or improving the vegetation community's resiliency and improving land ecosystems and resiliency. Vegetation would be managed for FFO-VCC 2, which would allow some departure from FFO-VCC 1 conditions. Although the BLM would conduct vegetation treatments under the BLM No Action Alternative, its Alternative A formalizes and prioritizes treatment purposes in GMUs to include system resiliency and maintaining or improving land conditions. This would improve general vegetation and soil conditions in the long term and formalize treatment purposes by GMU and priority GMUs for treatment, as shown in **Figure 2-1**, BLM Alternative A: Vegetation Treatments.

Lands with Wilderness Characteristics

Under vegetation management, no mechanical or surface-disturbing vegetation treatments on lands managed to protect wilderness characteristics would occur. This would maintain existing soil and vegetation systems and protect these resources from destruction and damage, because the surface would not be disturbed. Outside these lands, mechanical and surface-disturbing vegetation treatments could impact vegetation and soils as described under *BLM No Action Alternative*.

The BLM would manage 24,300 acres across four units to protect wilderness characteristics as a priority over other multiple uses. This would prevent incompatible land uses that alter wilderness characteristics, thereby limiting or preventing surface-disturbing activities that affect vegetation and soil conditions. Compared with the BLM No Action Alternative, this would limit or prevent soil compaction and wind or water erosion and destruction or disturbance of vegetation in the long term.

Fluid Minerals and Lands and Realty

The types of impacts from oil and gas and ROW development on vegetation and soil conditions that would occur under BLM Alternative A are similar to those under the BLM No Action Alternative; however, overall management actions that would prevent or minimize surface disturbances would increase under BLM Alternative A. There would be an approximately 16 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). All fragile soils except those in designated utility corridors would be managed as either ROW avoidance or ROW exclusion (see **Table 3-27**). This would minimize or prevent erosion and compaction impacts from surface disturbance. Fragile soils in utility corridors would be subject to these impacts. However, by concentrating ROW development in designated

utility corridors, management would reduce impacts outside of those corridors. Under BLM Alternative A, sensitive soils, such as Badland soils and biological soil crusts, and pristine benches also would be protected from disturbance and vegetation removal.

BLM Alternative B (Including BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

Vegetation Management

Vegetation treatments in GMUs would prioritize improving or maintaining soil stability and the landscape's unique aesthetics. Vegetation would be managed for FFO-VCC I, the highest condition for each vegetation community. Although the BLM would treat vegetation under its No Action Alternative, BLM Alternative B would formalize and prioritize treatment purposes in GMUs to include soil stability (and other attributes) in all GMUs to improve vegetation and soil resiliency in the long term, as shown in **Figure 2-2**, BLM Alternative B: Vegetation Treatments.

Lands with Wilderness Characteristics

The impacts on soil and vegetation conditions from managing 24,300 acres to protect wilderness characteristics as a priority over other multiple uses would be similar to those under BLM Alternative A; however, there would be fewer surface-disturbing limitations or prohibitions, resulting in more opportunities to affect vegetation and soil conditions than BLM Alternative A. BLM Alternative B would still limit or prevent more surface-disturbing activities in lands with wilderness characteristics than the BLM No Action Alternative.

The impacts on vegetation and soil resources from mechanical or surface-disturbing vegetation treatments in lands managed to protect wilderness characteristics would be the same as those under BLM Alternative A.

Lands and Realty

The types of impacts from ROW development on vegetation and soil conditions that would occur under BLM Alternative B are similar to those under the BLM No Action Alternative; however, overall management actions that would prevent or minimize surface disturbances would increase under BLM Alternative B. BLM Alternative B would have the most ROW exclusion acres out of any alternative, all of which would protect more vegetation and soils. There would be an approximately 9 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative).

Similar to BLM Alternative A, all fragile soils except those in designated utility corridors would be managed as either ROW avoidance or ROW exclusion, which would minimize or prevent erosion and compaction impacts from surface disturbance (see **Table 3-27**). Fragile soils within utility corridors would be impacted as described under BLM Alternative A. Overall, this alternative would have the most fragile soils managed as ROW exclusion, providing the most protection of these resources from erosion and compaction.

Application of CSU stipulations on sensitive soils, and pristine benches would have the same impacts as those described under BLM Alternative A.

Fluid Minerals

BLM Sub-Alternative B1

Under this sub-alternative, there would be a 2 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 426,500 acres of BLM surface decision area as NSO, and 231,800 acres of BLM surface decision as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for damage to vegetation and soils, compared with the BLM No Action Alternative.

BLM Sub-Alternative B2

Under this sub-alternative, there would be a 3 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 398,100 acres of BLM surface decision area as NSO, and 571,300 acres of BLM surface decision area as closed to oil and gas leasing would reduce surface disturbance in those areas. These measures would reduce the potential for damage to vegetation and soils, compared with the BLM No Action Alternative.

BLM Alternative C (Includes BLM Sub-Alternatives C1–C6; applying only to Fluid Minerals)

Vegetation Management

Vegetation treatments in GMUs would prioritize enhancing traditional and historical use of vegetation. Vegetation would be managed for FFO-VCC 3, which would allow for further departure from FFO-VCC 1 conditions. Although the BLM would conduct vegetation treatments under its No Action Alternative, BLM Alternative C would formalize treatment purposes to include soil stability in GMUs 2A and 2B (as well as other attributes in the GMUs). This would improve conditions for vegetation and soil conditions in the long term, formalize and prioritize treatment purposes by GMU, and prioritize GMU 2A, as shown in **Figure 2-3**, BLM Alternatives C and D: Vegetation Treatments. The impacts on vegetation and soil resources from mechanical or surface-disturbing vegetation treatments would be the same as those under the BLM No Action Alternative.

Lands with Wilderness Characteristics

Under BLM Alternative C, as with the BLM No Action Alternative, vegetation and soils in lands with wilderness characteristics would not receive any special management; therefore, they would continue to be impacted by development in the same manner as vegetation and soils in the rest of the BLM surface decision area.

Lands and Realty

Under BLM Alternative C, 2,100 acres of fragile soils would be protected by ROW restrictions. However, the types of impacts from ROW development on vegetation and soil conditions that would occur under BLM Alternative C are similar to those under the BLM No Action Alternative.

Fluid Minerals

Under all sub-alternatives, there would be a less than 1 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). In areas managed as closed or subject to NSO stipulations, localized impacts of new oil and gas-related surface disturbance on water resources would be prevented. These measures would reduce the potential for impacts on vegetation and soils, compared with the BLM No Action Alternative.

BLM Alternative D

Vegetation Management

Vegetation treatments in GMUs would prioritize improving weed management and improving or maintaining soil stability to mitigate increased resource use; vegetation would be managed for FFO-VCC 3, which would allow for further departure from FFO-VCC 1 conditions. Although the BLM would conduct vegetation treatments under its No Action Alternative, BLM Alternative D would formalize treatment purposes in GMUs to include soil stability and other attributes in all GMUs. This would improve vegetation and soil conditions in the long term and formalize and prioritize treatment purposes by GMU and priority GMUs for treatment, as shown in **Figure 2-3**, BLM Alternatives C and D: Vegetation Treatments. The same level of surface disturbance is projected as under the BLM No Action Alternative (1,315,600 acres would be subject to vegetation treatments).

Lands with Wilderness Characteristics

Like under the BLM No Action Alternative, under BLM Alternative C, vegetation and soils in lands with wilderness characteristics would not receive any special management; therefore, they would continue to be impacted by development in the same manner as vegetation and soils in the rest of the BLM surface decision area.

Lands and Realty

Under BLM Alternative C, 2,100 acres of fragile soils would be protected by ROW restrictions. However, the types of impacts from ROW development on vegetation and soil conditions that would occur under BLM Alternative D are similar to those under the BLM No Action Alternative.

Fluid Minerals

The types of impacts from oil and gas development on vegetation and soil conditions that would occur under BLM Alternative D are similar to those under the BLM No Action Alternative. The same level of surface disturbance is projected as under the BLM No Action Alternative (1,315,600 acres would be subject to vegetation treatments). Alternative; however, overall management actions that would prevent or minimize surface disturbances would increase under BLM Alternative D. There would be an approximately less than 1 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Impacts from oil and gas development on sensitive soils and pristine benches would be the same as those described under BLM Alternative A.

BIA Alternatives

Impacts Common to All BIA Alternatives

Under all BIA alternatives, additional surface disturbance from oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative. New surface disturbance would result in habitat fragmentation, landscape connectivity and habitat corridor disruption, and reduced cover of native species.

Under all BIA alternatives, before the lessee enters the leased land or disturbs the surface, the lessee would need to submit NEPA compliance documentation. This is to ensure that the surface, natural resources, the environment, and existing improvements are properly protected, and disturbed areas are reclaimed in a timely manner. After the BIA analyzes the NEPA document, it would notify the lessee of the stipulations and the conditions that the proposed surface disturbance operations would be subject to. This would maintain or minimize impacts on vegetation communities before the surface is disturbed on individual Indian allotment lands.

The BIA would require the lessee to minimize unnecessary damage to vegetation, timber, crops, or other cover resulting from the operation authorized by the lease. This would help control erosion and maintain the resiliency of vegetation communities in fluid minerals lease areas under all alternatives.

Vehicular access to the well site would continue to be limited to the approved access road. This would confine vehicle use to approved roads, which would minimize, for example, vegetation mortality and soil erosion caused by vehicles.

BIA No Action Alternative

Under fluid minerals management, the BIA would continue to have no stipulations with respect to infrastructure placement to minimize surface disturbance. The placement of infrastructure could continue to spread across the landscape, affecting vegetation and soil conditions from soil compaction and wind and water erosion.

The BIA would continue to not have a stipulation in current BIA management requiring restoration after construction of range improvements; however, some informal restoration might continue.

BIA Alternative A

Under BIA Alternative A, roads, utilities, and pipelines may share common ROWs to minimize surface disturbance. Collocating infrastructure would minimize surface disturbances that can destroy or disturb vegetation and cause soil compaction and wind and water erosion. This would maintain vegetation and soil resiliency more than under the BIA No Action Alternative.

Requiring interim reclamation and applying larger setbacks from structures and water bodies could contribute to reduced levels of surface disturbance in localized areas under this alternative, compared with the BIA No Action Alternative. This would result in less potential for habitat fragmentation, landscape connectivity and habitat corridor disruption, and reduced cover of native species, compared with the BIA No Action Alternative. This also would minimize impacts on vegetation and soil resources over a larger area.

Any range improvement, such as fences, pipelines, and ponds, disturbed by construction would be restored immediately to the condition they were in before disturbance, or better. This would restore vegetation and soil conditions, which would minimize impacts on soil resources from surface disturbances.

BIA Alternative B

Interim reclamation would be required to reestablish local native vegetation on well locations. This would help to increase vegetation cover and protect soils from erosion, as compared with the BIA No Action Alternative.

Impacts of roads, utilities, and pipelines sharing common ROWs to minimize surface disturbance would be the same as those described under BIA Alternative A. Also, directional drilling may be required, where practical, to collocate wells to reduce road, well pad, and utility surface disturbance. Collocating infrastructure and preventing surface disturbance would minimize and prevent surface disturbances that can cause vegetation destruction or disturbance and soil compaction and wind and water erosion. This would maintain soil resiliency more than under the BIA No Action Alternative.

The impacts on soil resources from range improvements would be the same as those under BIA Alternative A.

BIA Alternative C

Impacts of roads, utilities, and pipelines sharing common ROWs to minimize surface disturbance would be the same as those described under BIA Alternative A. Impacts of collocating infrastructure using directional drilling would be the same as those described under BIA Alternative B.

The impacts on vegetation and soil resources from range improvements would be the same as those under BIA Alternative A.

BIA Alternative D

Impacts of roads, utilities, and pipelines sharing common ROWs to minimize surface disturbance would be the same as those described under BIA Alternative A. Also, infrastructure would be sited to accommodate the needs of the landowner. Collocating infrastructure and considering the needs to the landowner would minimize surface disturbances that can cause vegetation destruction or disturbance and soil compaction and wind and water erosion. It also would take into consideration the conditions of the land cover next to fluid mineral infrastructure. This would maintain vegetation and soil resiliency more than under the BIA No Action Alternative.

The impacts on vegetation and soil resources from range improvements would be the same as those under BIA Alternative A.

Cumulative Impacts

The cumulative impact analysis for vegetation and soil resources is the planning area. Combined with other past, present, and reasonably foreseeable future actions, activities and development on BLM- and BIA-managed lands in the planning area would contribute to short- and long-term surface disturbances. This would reduce upland vegetation cover; increase fragmentation; increase landscape connectivity and habitat corridor disruption; and affect soil conditions, fragile soils, and sensitive soils. Moreover, it could affect VCC through increases in noxious weed presence or changes in wildlife habitats. Activities affecting vegetation and soils include: past, present, and future energy and minerals development, land use authorizations, livestock grazing, recreation, travel, vegetation and rangeland treatments and projects, forest gathering and cutting, water infrastructure, and fires.

Increasing recreation pressure would continue to disturb vegetation and spread noxious weeds and invasive plant species. This could result in a reduction of native vegetation and soil stability and a corresponding increase in erosion rates. The impacts of climate change on vegetation and soil resources may be subtle and could be difficult to detect until a change threshold has been crossed. This could result in growing impacts on soil resources, particularly on those lands with extensive surface disturbance, fragile soils, or sensitive soils. This would come about when combined with warmer temperatures, changes in rainfall and runoff, and the resulting shifts in vegetation communities.

Development of fluid mineral resources places a major regional or national demand on vegetation and soil resources in the planning area, including such surface-disturbing activities as mineral extraction and ROW development. Continued fluid mineral development generally requires both permanent and temporary roads, pits, drilled wells, and associated well pads, pipelines, and transmission lines and the necessary service roads for these facilities. Impacts from fluid mineral management on BLM- and BIA-managed minerals may result in additional surface disturbance from exploration and development; however, the required stipulations to protect important values would incidentally protect vegetation and soil resources and reduce the potential for disturbance, soil compaction, and wind and water erosion.

Cumulative impacts on vegetation and soil resources could increase over time. Under the BLM No Action Alternative, CSU stipulations are applied to minimize cumulative impacts on soil resources. Overall management actions that would prevent or minimize such impacts would increase under BLM and BIA Alternative D. All management actions that would prevent or minimize cumulative impacts on most soil resources would increase under BLM and BIA Alternatives B and C.

New surface disturbance is projected to be less under BLM and BIA Alternatives A, B, and C than under the BLM and BIA No Action Alternatives (see **Table 3-1**, RFD Projections by Alternative; however, any surface disturbance would contribute to reductions of vegetation cover and increased fragmentation and would disrupt landscape connectivity in the long term. Management actions under BLM and BIA Alternatives A, B, C, and D would help to minimize cumulative impacts, compared with the BLM and BIA No Action Alternative. This would apply specifically to management actions with NSO and CSU stipulations.

Travel and transportation, lands and realty authorizations, and livestock grazing could also contribute to reductions in vegetation cover under all BLM and BIA alternatives, particularly when combined with fluid mineral development. BLM and BIA Alternative A would have the most management actions that would prevent or minimize cumulative impacts on vegetation and soil resources; however, under all action alternatives, preventing or minimizing surface disturbances on fragile and sensitive soils would be emphasized to prevent or minimize cumulative impacts. In addition, vegetation treatments can help maintain and improve conditions for vegetation and soil resources under all action alternatives, especially BLM and BIA Alternatives B, C, and D, which prioritize soil stability. Implementing BMPs would further reduce cumulative impacts on vegetation and soil resources.

3.4.6 Noxious Weeds and Invasive Plants

Affected Environment

Current Conditions

Noxious weeds and invasive plants are found in the San Juan Basin, particularly in areas with disturbed surfaces. These plants displace native plant communities and degrade wildlife habitat. Loss of native vegetation generally is not only a result of direct biotic competition between native and nonnative plants. Land use practices, hydrologic modifications, and other habitat alterations can also displace native plants, and often create more favorable conditions for nonnative plants. The New Mexico Noxious Weed List (NMDA 2016) is the baseline document that the BLM and Navajo Nation use to establish primary noxious weed species of concern.

The BIA controls noxious weeds and invasive plant species in cooperation with the Navajo Nation and other Tribal, federal, and state agencies, management groups, private landowners, and industry. The BIA controls approximately 50,000 acres of weeds annually across the Navajo Nation, using a variety of methods.

Trends

Observations indicate some noxious weeds and invasive plants are spreading or increasing in density in parts of the planning area, especially in oil and gas fields, along roadways, and in some watersheds. Typically, as ground disturbance increases in areas of known populations, the distribution of noxious and invasive plants also increases.

Focused efforts have limited the spread and reduced the size of noxious weeds and invasive plant populations in areas. Examples of such efforts are as follows:

- Spot treating populations of noxious weeds and invasive plants
- Applying herbicide before seeding (targeting cheatgrass)
- Mowing or Dixie harrowing and seeding
- Using prescribed fire
- Seeding with native species after treating noxious weeds
- Routinely inventorying and monitoring noxious weeds

Although federal, Tribal, state, county, and private entities are working to control many noxious weeds and invasive plant species, control objectives are not being fully met. This is because of the large scale of infestations and lack of resources needed to treat these species.

Environmental Consequences

BLM Alternatives

There are no BLM decisions being considered that would affect noxious weeds and invasive plants beyond the impacts analyzed in the 2003 RMP, the 2007 Vegetation Treatments Using Herbicides Programmatic EIS, and the 2016 Programmatic EIS for National Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron. While varying levels of projected surface disturbance may affect the opportunities for noxious weeds to establish and spread, the methods for treatment of these species and impacts of those treatments would not change; therefore, impacts on noxious weeds and invasive plants from BLM alternatives are not discussed in the FMG RMPA/EIS.

BIA Alternatives

Impacts Common to All BIA Alternatives

Under all BIA alternatives, additional surface disturbance from oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative. New surface disturbance could increase noxious weeds.

Under all BIA alternatives, the BIA would continue to require the lessee to minimize unnecessary damage to vegetation from the operation authorized by the lease. This would reduce the likelihood of an increase in

noxious weeds in fluid minerals lease areas. Before entering the leased land or disturbing the surface, the lessee would continue to submit NEPA compliance documentation. This would be to ensure that the surface, natural resources, the environment, and improvements are protected and that disturbed areas are reclaimed in a timely manner. On completion of the analysis, the BIA would continue to notify the lessee of the stipulations and the conditions that the proposed surface disturbance operations would be subject to. This would reduce the likelihood of an increase in noxious weeds, due to surface-disturbing activities on individual Indian allotment lands; however, it would not eliminate the potential for impacts.

By confining vehicle use to approved roads, an increase in noxious weeds caused by vehicles would be less likely under all BIA alternatives.

BIA No Action Alternative

The BIA would still not have a management stipulation requiring restoration after construction of range improvements; however, some informal restoration would likely continue. This would restore vegetation and soil conditions, which would minimize the spread of noxious weeds by creating conditions less conducive to noxious weeds.

BIA Alternative A

Under BIA Alternative A, interim reclamation would be required for local native vegetation to reestablish itself on well locations. Requiring reclamation would reduce the likelihood of an increase in noxious weeds, due to the reestablishment of native species.

Requiring the lessee to refrain from destroying or damaging woodlands and vegetation would reduce the likelihood for an increase in noxious weeds, compared with the BIA No Action Alternative.

Any range improvement, such as fences, pipelines, and ponds, disturbed by construction would be restored immediately following construction. They would be restored to the condition they were in before disturbance, or better. This would restore vegetation and soil conditions, which would minimize the introduction and spread of noxious weeds from surface disturbances.

BIA Alternative B

Impacts would be the same as those described under BIA Alternative A.

BIA Alternative C

Impacts would be the same as those described under BIA Alternative A.

BIA Alternative D

Impacts would be the same as those described under BIA Alternative A.

Cumulative Impacts

The cumulative impacts analysis area for noxious weeds and invasive plants is the planning area. Combined with other past, present, and reasonably foreseeable future actions, activities and development on BLM- and BIA-managed lands in the planning area would contribute to short- and long-term surface disturbance. This would increase the opportunity for noxious weeds and invasive plants to establish populations and to expand. These types of surface-disturbing activities resulting in these impacts are energy and minerals development, lands and realty, livestock grazing, recreation, travel and transportation management, and wildland fire.

Activities specifically related to recreation, transportation management, and grazing could contribute to noxious weed spread. This is because seeds may be carried by motorized/mechanized equipment, people, or animals and deposited into previously un-infested areas, regardless of the landownership.

Under all BLM and BIA alternatives, BLM management actions specific to noxious weed inventory, monitoring, control, and education would help to minimize or reduce the abundance of noxious weeds. BIA management actions specific to interim reclamation under the BIA action alternatives would reduce the

likelihood of increased populations; however, noxious weeds would still be expected to occur throughout the planning area.

The most significant factor contributing to surface disturbance in the planning area would be fluid mineral exploration and development. Projections for new surface disturbance in the planning area from oil and gas development would be greatest under the BLM and BIA No Action Alternatives and the BLM and BIA Alternative D (see **Table 3-1**, RFD Projections by Alternative). New surface disturbance is projected to be less under BLM and BIA Alternative A, B, and C.

This type of surface disturbance would result in long-term potential for increased noxious weed abundance, due to soil disturbance and vehicle use. Hydraulic fracturing requires more surface disturbance to accommodate additional vehicles and equipment in the short-term versus conventional extraction; therefore, hydraulic fracturing would result in a greater potential for noxious and invasive weeds to spread. Horizontal drilling results in more surface disturbance on a single well pad; however, multiple horizontal wells can be drilled from a single well pad, so overall surface disturbance is diminished. The BLM projects that approximately 71-72 percent of the wells drilled in the planning area in the next 20 years would be horizontal wells (**Appendix I**).

3.4.7 Wildlife and Migratory Birds

Affected Environment

Current Conditions

The BLM FFO currently manages ten wildlife SDAs, including Cereza Canyon, Crow Mesa, East La Plata, Ensenada Mesa, Gonzales Mesa, Laguna Seca Mesa, Middle Mesa, Rattlesnake Canyon, Rosa Mesa, and Thomas Canyon ERMA/Wildlife Area, encompassing 392,192 acres. Management stipulations of these areas are changing through the development of the RMPA/EIS (**Table 3-28**). A detail of leasing stipulations for each wildlife area is presented in **Table 3-28**, Fluid Mineral Leasing Stipulations for Wildlife Areas.

As per the 2003 RMP, these areas are managed to protect and preserve wildlife and their habitat and support increases in potential wildlife. Crow Mesa and East La Plata have a focus on protecting big game and their habitat. Crow Mesa is within the projected high development potential scenario area (BLM 2018). These wildlife areas serve as important wintering and calving grounds primarily for mule deer, elk, and pronghorn with portions designated as critical deer winter range habitat in Middle Mesa.

Wildlife corridors have been identified by local BLM biologists and supported by mule deer migration studies using telemetry collars by Hall Sawyer (2006, 2009) in Rosa Mesa. These wildlife corridors cross portions of the FFO and lead in and out of the ten wildlife SDAs. These corridors are critical to the survival of the species as they allow access to summer and winter ranges (Sawyer 2006, 2009).

There are portions of two Navajo Nation Big Game Hunting Units in the planning area: Units 13 and 14. These units are roughly bounded by US-491 on the west, the San Juan River valley to the north, US-550 on the east, and Interstate 40 to the south (NNDFW 2019). Currently, the Navajo Nation Department of Fish and Wildlife (NNDFW) permits mule deer and elk hunts in these units (NNDFW 2018).

More information regarding Navajo Nation listed species and associated wildlife areas managed by the Navajo Nation is located under the Special Status and Listed Species, Section AE.2.8.

Common game species in the planning area are mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), wild turkey, upland game birds, and furbearers. Mountain lion (*Felis concolor*), pronghorn antelope (*Antilocapra americana*), and black bear (*Ursus americanus*) also inhabit portions of the planning area (**Figure 3-12**, Wildlife SDAs), as well as other small mammals, reptiles and amphibians.

Bat surveys in the planning area have detected 14 species, the most common of which are the California myotis (*Myotis californicus*), long-legged myotis (*M. volans*), long-eared myotis (*M. evotis*), and big brown bat (*Eptesicus fuscus*; Gannon 1998).

A variety of migratory songbird species use habitats in the planning area for breeding, nesting, and foraging. The New Mexico Avian Conservation Partners (NMACP) Bird Conservation Plan identifies a number of bird species in the Colorado Plateau physiographic region as priority species. Some with the highest priority have been detected in the planning area; these are sage sparrow (*Artemisiospiza nevadensis*), mountain bluebird (*Sialia currucoides*), loggerhead shrike (*Lanius ludovicianus*), and gray vireo (*Vireo vicinior*). The NMACP has identified the pinyon jay and western bluebird (*Sialia mexicana*) as having a high percentage (over 10 percent) of their US population in the FFO (Johnson et al. 2015).

Populations of ferruginous hawks (*Buteo regalis*) have historically had few nests on BLM-managed lands. On Navajo lands, ferruginous hawk nests are relatively more common. Across the planning area, populations of golden eagles (*Aquila chrysaetos*) have remained stable since 2003.¹ Wintering populations of bald eagles have remained stable since 2003. One bald eagle nest identified in 2015 produced fledglings in both 2016 and 2017.²

Trends

In general, elk and pronghorn antelope populations have remained stable for the last 3 years (NMDGF 2018). Mule deer have been stable in various regions in the planning area (New Mexico State University 2014). In GMU 2A, where there is existing and ongoing oil and gas development, surveys of deer populations between 2000 and 2010 estimated a fawn-to-doe ratio of 61:100. In the Rosa Mesa Wildlife Area, where there is also existing and ongoing oil and gas development, the fawn-to-doe ratio is estimated at 59.1:100. This is fairly high, considering the human activity in that area; however, in other parts of the planning area, mule deer populations have been declining (New Mexico State University 2014).

Other wildlife, including black bear, mountain lion, and turkey (*Meleagris gallopavo*), are increasing in numbers (BISON-M 2018). Current and proposed oil and gas development is expected to continue, which would continue to increase habitat loss and fragmentation for wildlife species. Specifically, future increased development and climate change could disrupt travel corridors and secure areas for fawning and calving, reduce the amount of forage, and cause habitat avoidance, thereby shrinking the acreage of effective habitat available to wildlife.

Across North America and in the Western Hemisphere, bird populations have declined, particularly grassland birds (Rosenberg 2019). These declines are largely attributed to the loss of habitat due to fragmentation and other landscape modifications, including urbanization (Rosenberg 2019). Most human-induced changes in bird populations and distributions have occurred in the recent past. Other primary factors are natural disasters, loss or alteration of habitat in nonbreeding areas and along migratory routes, and brood parasitism³ (Rosenberg 2019).

The FFO has been collecting long-term population data for sagebrush-obligate bird species. Since 2003, sage sparrow populations in the planning area have been stable to slightly increasing, and Brewer's sparrow numbers have been increasing. Sage thrasher populations have been declining, and herbicide treatments may play a role (Buseck et al. 2004). A number of federal programs have been initiated to reverse the decline in bird populations. Migratory bird populations will continue to be affected by habitat fragmentation and climate change, reducing effective habitat available for nesting, migratory stopovers, and winter habitat for many bird species.

¹ John Kendall, BLM FFO Wildlife Biologist, personal communication with Dan Morta, EMPSi Biological Specialist. February 2018.

² John Kendall, BLM FFO Wildlife Biologist, personal communication with Dan Morta, EMPSi Biological Specialist. February 2018.

³ When a host raises the young of a parasite instead of the host's own young.

Environmental Consequences

BLM Alternatives

Impacts Common to All BLM Alternatives

Vegetation Management and Lands with Wilderness Characteristics

Under all the BLM alternatives, vegetation treatments could affect wildlife and migratory birds through increased surface disturbance or temporary, short-term human presence. These impacts, however, would be mitigated by application of vegetation management actions described in **Table 2-2**, such as timing limitations and avoidance areas. In the long term, vegetation treatments would reduce nonnative, invasive or noxious species and promote reestablishment of native vegetation and appropriate vegetation cover, thereby reducing impacts on wildlife and migratory birds.

Management of lands with wilderness characteristics would not independently contribute to impacts on wildlife and migratory birds. Restrictions on fluid mineral and ROW development in lands managed to protect wilderness characteristics as a priority over other multiple uses are included in the overall discussion of impacts from fluid minerals and lands and realty management under each alternative. For these reasons, vegetation and lands with wilderness characteristics management are not discussed further in this section.

Fluid Minerals and Land and Realty

Under all alternatives, artificial lighting associated with mineral development could affect wildlife and migratory birds by affecting foraging, reproduction, communication, and other critical behaviors (Longcore and Rich 2004). Impacts on wildlife would include disturbance and changes in habitat, alteration of nesting density, and disturbance to prey habitat.

The operation of equipment associated with fluid mineral development would also create noise that would result in effects on wildlife physiology and behavior, as described in *Nature and Type of Effects* in the Environmental Consequences Supplemental Report, Section EC.2.7, Wildlife.

The use of open pits during oil and gas exploration, construction, and production poses a risk to migratory birds, bats, and other wildlife. Various BLM memorandums and policies outline requirements of pits for protection of migratory birds and wildlife; however, improper or lack of application of stipulations or guidelines designed for protection may lead to direct and indirect impacts on migratory birds, bats, and other wildlife. Direct impacts on migratory birds, bats, and other wildlife from exposure to hydraulic fracturing fluids, hydrocarbons, or other chemicals in open pits may include, but are not limited to, entrapment, ingestion of toxins, and exposure to chemicals that may degrade flight feathers or fur or may adhere to flight feathers or fur, all of which may ultimately lead to stress or death of the individual or offspring (USFWS 2019).

Future fluid mineral development could result in the disturbance or loss of plant communities, food supplies, cover, wildlife migration corridors, or breeding sites for wildlife and migratory birds within a maximum of 75,000 acres (**Appendix I**). This would be due to the projected development of well pads, access routes, and other ancillary facilities that result in surface disturbance or noise.

Impacts on big game habitat, including breeding, calving, and wintering habitat, would include direct loss of habitat and interference with migration corridors. These impacts would be lessened through stipulations, including CSU, NSO, and seasonal timing limitations on drilling and construction. Impacts on migration corridors would be greater and long term, since portions of these corridors are outside the boundaries of the wildlife SDAs.

Under all alternatives, well density and resulting habitat fragmentation are likely to increase in the southern portion of the BLM decision areas where moderate- and high-potential oil and gas resources overlap with low or zero well-density areas (**Figure 3-13**, Well Density and BLM Alternatives). The well-density increase would be lowest under BLM Alternative B because most of the unleased, moderate-potential, low or zero well-density areas would be closed to leasing.

Under all the BLM alternatives, requiring pipelines to follow existing roads or ROWs, where feasible, would minimize disturbance to habitats and reduce fragmentation, thereby reducing the effects on terrestrial wildlife and migratory birds. Impacts on wildlife would include reduced habitat disturbance, degradation, and removal.

Lands and realty mitigation measures to protect or restore wildlife habitat would include the stipulation that no hardwood tree with a diameter of 8 inches or more at the base or any ponderosa pine, Douglas-fir, or aspen tree is to be removed or damaged without approval from the BLM Authorized Officer. Protection of the selected tree species would reduce disturbance and changes in habitat, food supplies, cover, and breeding sites for wildlife in the decision areas.

Under all the BLM alternatives, leasing stipulations would be applied to federal mineral estate in the BLM mineral decision area. Leasing stipulations apply primarily in SDAs, including wildlife area SDAs, and the designated wildlife areas would be affected to varying degrees under each alternative. The boundaries of the SDAs will not be changing under any of the alternatives; however, stipulations within the boundaries of the SDAs will. Currently, all acreage within the ten wildlife SDAs includes timing limitation stipulations. Under all alternatives, timing limitation stipulations for oil and gas development activities, as well as vegetation treatments, would protect wildlife within the designated SDAs during fawning and wintering seasons. A detail of leasing stipulations for each wildlife area per alternative is presented in **Table 3-28**, Fluid Mineral Leasing Stipulations for Wildlife Areas.

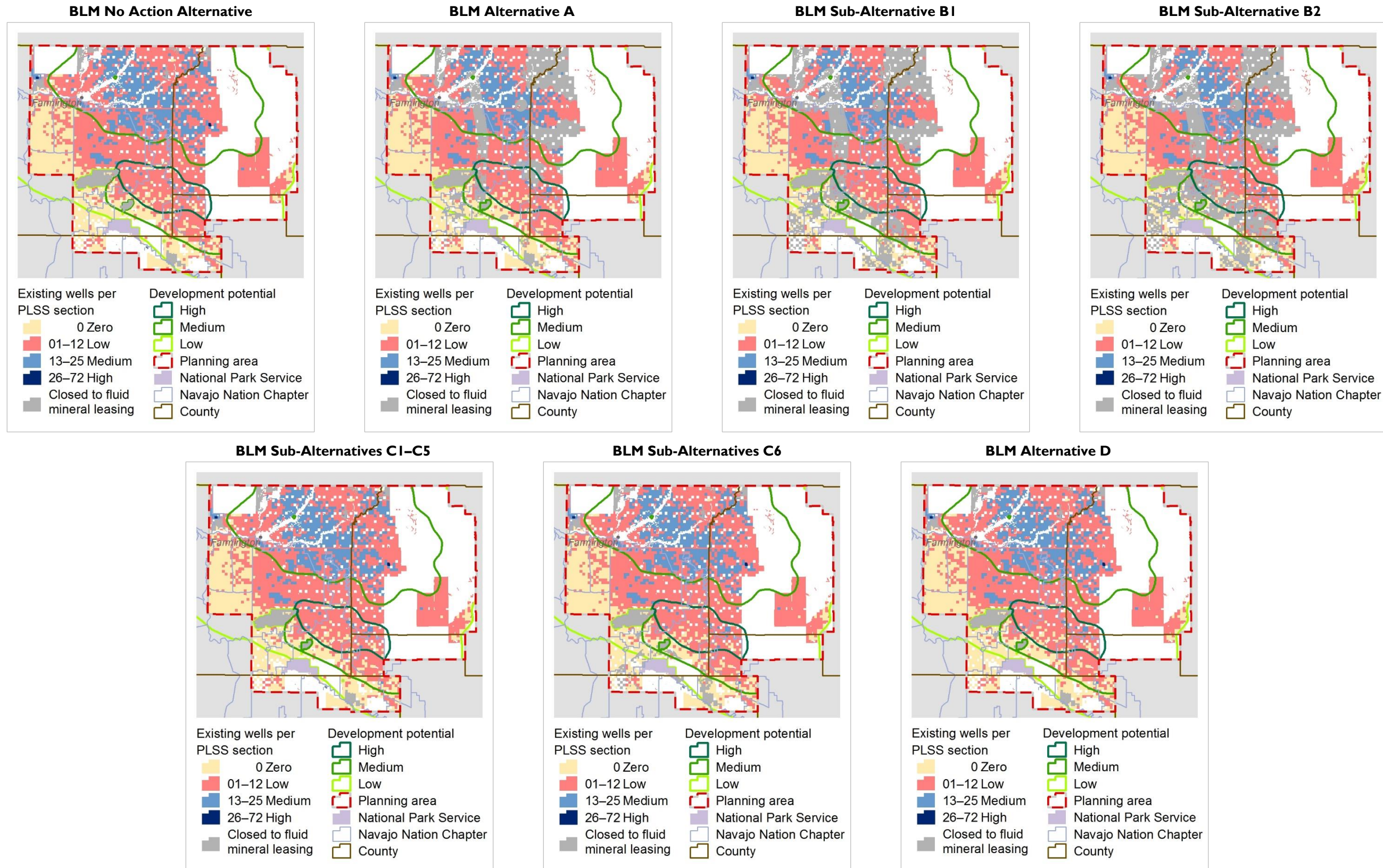
Application of COAs, such as measures to prevent light pollution and reduce habitat fragmentation (see **Appendix C**) could reduce impacts on wildlife whenever they are applied to APDs under any alternative. When applied, these conservation measures would limit vegetation loss, sediment delivery, interference with movement patterns, exposure to frac ponds, and risk of spills or releases on wildlife and migratory birds.

The current interim management policy for the BLM/FFO for meeting the BLM responsibilities under the Migratory Bird Treaty Act is provided in Instruction Memorandum No. NM-F00-2010-001 (BLM 2010b). Under all alternatives, impacts on migratory birds would be approached using the BLM (2010b) Instruction Memorandum.

For projects proposing 4 acres or more of surface disturbance, no construction activities from May 15 to July 31 would be permitted without a migratory bird nest survey. Due to the minimum project size (4 acres) that would be required to trigger the mitigation measures outlined in the BLM (2010b) Instruction Memorandum, impacts on migratory birds are more likely to occur when projects are under 4.0 acres.

Impacts on migratory birds, common to all BLM alternatives, would include habitat modification, degradation, fragmentation, and removal through the life of the well and long term following reclamation. Under the RFD projections, up to 1,881 new wells and 11,400 acres of new surface disturbance from oil and gas development are projected to be developed in the BLM mineral decision area in the next 20 years. Incidental take of migratory birds is more likely to occur in projects less than 4.0 acres in size. To avoid incidental take of migratory birds, site-specific reviews of well pads would be conducted; mitigation measures outlined in the COAs to be applied to APDs, BMPs that could be implemented, and other restrictive measures would be implemented as needed (**Appendix B** and **Appendix C**).

Figure 3-13
Well Density and BLM Alternatives



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**Table 3-28
Fluid Mineral Leasing Stipulations for Wildlife Areas**

Wildlife Area	Leasing Allocation	Alternatives (Acres)				
		No Action	A	B: (B1 & B2)	C: (C1-C6)	D
Cereza Canyon	Closed	0	26,200	26,200	0	0
	Open standard terms and conditions	0	0	0	0	1,400
	Open TL	26,200	0	0	26,200	0
	Open CSU	26,200	0	0	26,200	24,800
	Open NSO	1,200	0	0	100	100
Crow Mesa	Closed	0	34,200	1,800	0	0
	Open standard terms and conditions	0	0	0	0	2,700
	Open TL	34,200	0	32,400	34,200	0
	Open CSU	34,200	0	32,400	34,200	31,400
	Open NSO	1,000	0	32,400	600	500
East La Plata	Closed	5,800	5,800	5,800	5,800	5,800
	Open standard terms and conditions	0	0	0	0	0
	Open TL	0	0	5,800	0	5,800
	Open CSU	0	0	0	0	0
	Open NSO	0	0	0	0	0
Ensenada Mesa	Closed	0	45,800	45,800	0	0
	Open standard terms and conditions	0	0	0	0	17,900
	Open TL	45,800	0	0	45,800	0
	Open CSU	45,800	0	0	45,800	27,700
	Open NSO	4,200	0	0	3,800	3,700
Gonzales Mesa	Closed	0	6,100	6,100	0	0
	Open standard terms and conditions	0	0	0	0	800
	Open TL	6,100	0	0	6,100	0
	Open CSU	6,100	0	0	6,100	5,300
	Open NSO	400	0	0	100	100
Laguna Seca Mesa	Closed	0	0	0	0	0
	Open standard terms and conditions	0	0	0	0	200
	Open TL	9,200	9,200	9,200	9,200	0
	Open CSU	9,200	9,200	9,200	9,200	9,000
	Open NSO	400	8,200	7,700	3,100	400
Middle Mesa	Closed	1,200	40,700	40,700	1,200	1,200
	Open standard terms and conditions	0	0	0	0	15,800
	Open TL	39,500	0	0	39,500	1,300
	Open CSU	39,500	0	0	39,500	23,600
	Open NSO	700	0	0	800	400
Rattlesnake Canyon	Closed	4,900	17,300	17,300	4,900	4,900
	Open standard terms and conditions	0	0	0	0	20,100
	Open TL	93,100	80,700	80,800	93,200	700
	Open CSU	93,100	63,200	80,800	93,200	72,900
	Open NSO	2,900	80,700	41,100	2,400	1,600
Rosa Mesa	Closed	0	61,500	61,500	0	0
	Open standard terms and conditions	0	0	0	0	20,100
	Open TL	61,500	0	0	61,500	1,000
	Open CSU	61,500	0	0	61,500	41,400
	Open NSO	1,500	0	0	500	400

Wildlife Area	Leasing Allocation	Alternatives (Acres)				
		No Action	A	B: (B1 & B2)	C: (C1-C6)	D
Thomas Canyon ERMA/ Wildlife Area	Closed	12,900	12,900	12,900	12,900	12,900
	Open standard terms and conditions	0	0	0	0	0
	Open TL	0	0	0	0	0
	Open CSU	0	0	0	0	0
	Open NSO	0	0	0	0	0

Source: BLM 2019

Open = open to leasing CSU = controlled surface use

Closed = closed to leasing NSO = no surface occupancy

TL = timing limitation

BLM No Action Alternative

Under the BLM No Action Alternative, additional surface disturbance from oil and gas development in the BLM mineral decision area would continue to occur, as projected in **Table 3-1**, RFD Projections by Alternative.

Under the BLM No Action Alternative, collocating wells on existing well pads in any type of wildlife area would not be required. Surface disturbance may remain at higher levels, resulting in impacts on wildlife habitat. Impacts on wildlife habitat under the BLM No Action Alternative are habitat degradation from noise impacts and noxious weeds, direct removal of habitat that provides wildlife cover and forage, and reduction in nesting and breeding habitat.

Management actions specific to wildlife would continue to occur primarily in wilderness, legislatively protected areas, ACECs, and other areas that have additional wilderness-, vegetation-, or wildlife-specific use stipulations within a discrete geographic boundary; however, most management actions that are wildlife specific occur in designated wildlife areas (**Table 3-28**, Fluid Mineral Leasing Stipulations for Wildlife Areas). Approximately 32,100 acres of the BLM surface decision area would be closed to new leasing in wildlife SDAs. Management actions for special status and listed species may also indirectly affect wildlife in the BLM and BIA decision areas; those impacts are described in **Section 3.4.8**, Special Status and Listed Species. Acres of individual wildlife areas that may be affected by fluid mineral leasing management actions are detailed in **Table 3-28**.

To minimize and avoid impacts on wildlife and migratory birds, site-specific reviews of well pads would be conducted. Minimization and mitigation measures outlined in the COAs to be applied to APDs, along with BMPs that could be applied, and similar restrictive measures that would be implemented, as needed (see **Appendices B and C**).

Impacts Common to All BLM Action Alternatives

Vegetation Management

Vegetation treatments in GMUs would be assigned a priority level, and vegetation treatments would be conducted for specific purposes to meet management objectives. Conducting vegetation treatments to prioritize soil stability would increase habitat effectiveness and reduce habitat degradation; meeting objectives would enhance habitat, particularly under BLM Alternatives C and D where treatment purposes would include wildlife habitat and big game habitat, respectively. Compared with the BLM No Action Alternative, under the BLM Action Alternatives wildlife and migratory bird habitat would receive more protection due to vegetation treatments in GMUs.

Fluid Minerals and Lands and Realty

Under all BLM action alternatives, requiring remote telemetry of well data and piping of produced water, where feasible, would reduce the number of vehicle visits to wells. This, in turn, would reduce disturbance to wildlife and direct mortality as a result of vehicle collisions. Remote telemetry of well data would also

reduce the amount of dust and potential increased sedimentation that would disturb and change wildlife habitat, food supplies, cover, and suitability of breeding and nesting sites.

BLM Alternative A

Under BLM Alternative A, there would be an approximately 11 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative).

Lands and Realty

Under BLM Alternative A, the BLM would designate 28,000 acres as ROW exclusion and 1,060,400 acres as ROW avoidance areas; coupled with the requirement for new pipeline ROWs to follow existing disturbed areas, this would reduce the disturbance and removal of wildlife habitat. Impacts from requiring remote telemetry of well data and piping of produced water would be the same as those under the BLM No Action Alternative. Namely, the reduction in vehicle visits would reduce disturbance and changes in habitat. Under BLM Alternative A, there would be fewer impacts on wildlife habitat, compared with the BLM No Action Alternative.

Fluid Minerals

Under BLM Alternative A, approximately 397,900 acres of the BLM surface decision area would be closed to new leasing, including 257,800 acres of wildlife SDAs (**Table 3-28**). Compared with the BLM No Action Alternative, approximately 8 times as many acres of wildlife areas would be managed as closed to leasing. Additionally, approximately 8 times as many acres of wildlife areas would be subject to NSO stipulations.

Under BLM Alternative A, surface disturbance activities in wildlife areas would be limited to those areas subject to TL and CSU stipulations. Fluid mineral resource use and exploration in these areas would be restricted to avoid impacts like habitat modification, degradation, fragmentation, and destruction.

Closing federal mineral estate beneath Jackson Lake Wildlife Area to leasing would protect wildlife from habitat loss, modification, and degradation from activities associated with fluid mineral leasing. Compared with the BLM No Action Alternative, future impacts from fluid mineral leasing at the Jackson Lake Wildlife Area would decrease.

In addition, collocating wells on existing well pads would be required in sensitive wildlife areas under BLM Alternative A. This would reduce habitat modification, degradation, destruction, and fragmentation. Compared with the BLM No Action Alternative, there would be greater protection of wildlife areas.

BLM Alternative B (Includes BLM Sub-Alternatives B1 and B2; applicable only to Fluid Minerals)

Lands and Realty

Impacts from requiring pipelines to follow an existing disturbance, use remote telemetry of wells, and pipe produced water would be the same as those under BLM Alternative A. Compared with the BLM No Action Alternative, BLM Alternative B would decrease wildlife mortality from truck interactions. Dust and noise in wildlife habitat would also decrease with fewer truck trips.

Fluid Minerals

BLM Sub-Alternatives B1 and B2

Impacts from requiring wells to be collocated on existing well pads would be similar to those under BLM Alternative A except that this collocation would be required only in wildlife SDAs and not in other sensitive wildlife areas. These sub-alternatives would still reduce disturbance and removal of wildlife habitat, compared with the BLM No Action Alternative.

Under BLM Sub-alternatives B1 and B2, wildlife areas would primarily be managed as closed to leasing (**Table 3-28**). Compared with the BLM No Action Alternative, approximately 7 times as many acres (225,500) of wildlife areas would be managed as closed, and approximately 7 times as many acres (81,200) of wildlife areas would be subject to NSO stipulations.

Under BLM Sub-Alternatives B1 and B2, respective fluid mineral closure from miles 0-10 and 0-15 around the CCNHP boundary would allow for indirect protection to wildlife within these areas.

Under BLM Sub-Alternative B1, there would be an approximately 9 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Under BLM Sub-Alternative B2, there would be an approximately 15 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative).

Surface disturbance in wildlife areas would be limited to those areas subject to TL and CSU stipulations. Fluid mineral resource use and exploration in these areas would be restricted to avoid impacts like habitat modification, fragmentation, degradation, and destruction.

Impacts of closing Jackson Lake Wildlife Area to leasing under BLM Alternative B would be the same as those under BLM Alternative A.

BLM Alternative C (Includes BLM Sub-Alternatives C1–C6; applicable only to Fluid Minerals)

Lands and Realty

Requiring new pipelines to follow existing disturbance would have the same impacts as those under BLM Alternative A. Impacts of requiring remote telemetry of wells would be similar to those under BLM Alternative B except that liquid gathering systems would not be required.

Fluid Minerals

BLM Sub-Alternatives C1–C6

Under these sub-alternatives, there would be a less than 1 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative).

Compared with the BLM No Action Alternative, direct impacts on wildlife and indirect impacts on wildlife and migratory bird habitat from BLM Sub-Alternatives would be less than the BLM No Action Alternative. This would be because fewer truck trips would decrease wildlife mortality from truck interactions. Dust and noise in wildlife habitat would also decrease with fewer truck trips.

Collocating wells on existing well pads would not be required under BLM Sub-Alternatives. Wildlife and habitat could continue to be affected by additional surface disturbance from well pads as described under the BLM No Action Alternative.

When compared with the BLM No Action Alternative, the acreage in wildlife areas open to fluid mineral leasing under standard terms and conditions, closed to leasing, open under CSU stipulations, and open under timing limitations under BLM Sub-Alternatives C1–C6 would be the same as under the No Action Alternative. Areas open with NSO stipulations would be reduced by seven percent to 11,400 acres under all sub-alternatives. Because areas with NSO stipulations for fluid mineral leasing would decrease, BLM Sub-Alternatives C1–C6 could result in a higher potential for impacts on wildlife compared with the BLM No Action Alternative.

Under BLM Sub-Alternatives C1 to C5 the BLM would implement NSOs from miles 0 up to 10 around CCNHP. BLM Sub-Alternative C would include a closure from miles 0 to 4 and an NSO from miles 4 to 6. This would indirectly provide protection for wildlife that may be found within the NSO or closure zones.

BLM Alternative D

Under this alternative, the same level of surface disturbance is projected as under the BLM No Action Alternative.

Lands and Realty

Rights-of-way would be encouraged but not required to follow existing disturbance. This management under BLM Alternative D would have the same impacts on wildlife habitat as the BLM No Action Alternative.

Fluid Minerals

Impacts of requiring remote telemetry of wells would be the same as those under BLM Alternative C. Like the BLM No Action Alternative, collocating wells on existing well pads would not be required. Wildlife and habitat could continue to be affected by additional surface disturbance from well pads.

Wildlife areas would primarily be managed with CSU stipulations. Under BLM Alternative D, 79,100 acres in the Cereza Canyon, Crow Mesa, Ensenada Mesa, Gonzales Mesa, Laguna Seca Mesa, Middle Mesa, Rattlesnake Canyon, and Rosa Mesa Wildlife Areas would be open to leasing, subject to standard stipulations. Under the BLM No Action Alternative, no wildlife areas are open to leasing under standard terms and conditions. Approximately 3,000 acres of wildlife areas would be subject to TL stipulations, compared with 315,700 acres under the BLM No Action Alternative (**Table 3-28**); therefore, such impacts as habitat modification, fragmentation, degradation, and removal would increase, compared with the BLM No Action Alternative in these areas. Closures to leasing in wildlife areas would be the same as the BLM No Action Alternative, and wildlife areas subject to NSO stipulations would decrease by 41 percent to 7,300 acres.

Under BLM Alternative D, there would be no leasing stipulations or closures of federal mineral estate under Jackson Lake Wildlife Area. Impacts would be the same as those under the BLM No Action Alternative.

BIA Alternatives

Impacts Common to All BIA Alternatives

Well density and the resulting habitat fragmentation are likely to increase in the southern portion of the BIA decision areas, where moderate and high potential oil and gas resources overlap with low or zero well-density areas (**Figure 3-13**, Well Density and BLM Alternatives). Under all BIA alternatives, additional surface disturbance from oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative. Stipulations that reduce surface disturbance through collocating facilities or similar measures may reduce fragmentation in these areas.

Where oil and gas resources are developed in Navajo Nation big game hunting units, habitat and noise disturbance may lower habitat value and displace big game species. If severe enough, disturbance could depress population levels in the long-term. As above, stipulations that reduce disturbances would reduce the intensity of this impact.

BIA No Action Alternative

Under its No Action Alternative, the BIA would continue to limit well site vehicular access to approved access roads and would continue to apply setbacks from structures and water bodies. This would continue to limit surface disturbance associated with new roads and facilities and could limit the risk of wildlife habitat modification, degradation, fragmentation, and removal.

Under the BIA No Action Alternative, there are no stipulations for the lessee to develop and implement measures to control lighting and light resulting from flaring on well sites and off-site facilities. There are extensive considerations for sensitive wildlife habitat. Measures to mitigate negative impacts on sensitive wildlife habitat and migratory birds would continue to reduce impacts on behaviors for foraging, reproduction, communication, and other critical behaviors.

BIA Alternative A

This alternative would establish the greatest number and extent of specific measures designed to protect or enhance wildlife resource values.

Under BIA Alternative A, surface disturbance would be minimized by allowing roads, utilities, and pipelines to share common ROWs. Wildlife resources would be managed by minimizing surface disturbances. Impacts

on wildlife resources under BIA Alternative A would include habitat avoidance, habitat fragmentation, and movement pattern interference; however, these impacts would be reduced compared with the BIA No Action Alternative. Short-term and long-term impacts, such as habitat avoidance and habitat fragmentation, would also be reduced, relative to that alternative.

Requiring interim reclamation and applying larger setbacks from structures and water bodies could contribute to reduced levels of surface disturbance under this alternative, compared with the BIA No Action Alternative. This would result in less potential for wildlife habitat modification, degradation, fragmentation, and removal.

Under BIA Alternative A, the lessee would refrain from destroying or damaging woodlands and vegetation and would pay for damaged vegetation. Impacts on wildlife and migratory birds would be similar to those under the BIA No Action Alternative, impacts on wildlife habitat would be reduced, according to the value of the vegetation.

Compared with the BIA No Action Alternative, controlling light and lighting under BIA Alternative A would reduce the effects on wildlife and migratory bird foraging, reproduction, and communication behaviors.

BIA Alternative B

Directional drilling may be required and, where practical, wells would be collocated to reduce road, well pad, and surface disturbance. Surface disturbance would also be minimized by allowing roads, utilities, and pipelines to share common ROWs. Wildlife resources would be managed by minimizing surface disturbances. Impacts on wildlife resources would include habitat avoidance, habitat fragmentation, and interference with movement patterns; however, these impacts would be reduced compared with the BIA No Action Alternative. Short-term and long-term impacts, such as habitat avoidance and habitat fragmentation, would also be reduced, relative to the BIA No Action Alternative.

Under BIA Alternative B, refraining from destroying or damaging woodlands and vegetation would reduce impacts on wildlife and migratory birds, as described under BIA Alternative A.

Artificial lighting would not be managed specifically to limit impacts on wildlife; however, controlling light and lighting to protect key viewsheds would indirectly reduce the effects on wildlife and migratory bird foraging, reproduction, and communication. Under BIA Alternative B, impacts on wildlife from artificial lighting would be reduced, compared with the BIA No Action Alternative.

BIA Alternative C

BIA management affecting surface disturbance, and the impacts of that management on wildlife resources, would be the same as those under BIA Alternative B.

Refraining from destroying or damaging woodlands and vegetation would reduce impacts on wildlife and migratory birds, as described under BIA Alternative A.

Under BIA Alternative C, artificial lighting would not be managed specifically to limit impacts on wildlife; however, controlling light and lighting to protect sensitive receptors would indirectly reduce the effects on wildlife and migratory bird foraging, reproduction, and communication. Under BIA Alternative C, impacts on wildlife from artificial lighting would be reduced, compared with the BIA No Action Alternative.

BIA Alternative D

Requiring interim reclamation could contribute to reduced surface disturbance under this alternative, compared with the BIA No Action Alternative. This reduce the potential for wildlife habitat modification, degradation, fragmentation, and removal.

Under BIA Alternative D, refraining from destroying or damaging woodlands and vegetation would reduce impacts on wildlife and migratory birds, as described under BIA Alternative A.

Artificial lighting would not be managed specifically to limit impacts on wildlife; however, controlling light and lighting in general would indirectly reduce the effects on wildlife and migratory bird foraging, reproduction, and communication behaviors. Impacts on wildlife from artificial lighting would be reduced, compared with the BIA No Action Alternative.

Cumulative Impacts

The analysis area used for analyzing cumulative impacts on wildlife is the planning area and areas within about 50 miles. This includes parts of the BLM San Luis, Albuquerque, Tres Rios, and Hassayampa Field Offices, the Navajo Nation and other Tribal reservations, and other public and private lands. The larger analysis area is necessary because wildlife move across this larger landscape and animals and plants depend on ecosystems that extend over larger areas.

For wildlife species, the cumulative effects of each alternative are similar to those for special status and listed species (**Section 3.4.8**) and vegetation (**Section 3.4.5**). The development of potential or suitable habitat for wildlife species for other projects, such as the Four Corners Power Plant and Navajo Mine Energy Project, would contribute to habitat modification and degradation and wildlife species removal. Federal and state agency actions would generally mitigate impacts on wildlife species, and cumulative impacts would be minimized. Actions on private lands may not receive such analysis and are more likely to contribute to cumulative impacts.

Cumulative impacts under the BLM and BIA No Action Alternatives would decrease the acreage or quality of potential or suitable habitat for wildlife species. Relative to the BLM and BIA No Action Alternatives, the contribution of management to cumulative impacts under BLM and BIA Alternative A would be lower. This would be due to an emphasis on enhancing ecological systems and maintaining or improving the resiliency of ecosystems. Cumulative impacts under BLM Alternative A would increase acres of wildlife species habitat subject to BLM fluid mineral lease stipulations, such as NSOs, CSUs, and TLs. BLM and BIA Alternative A would contribute the least to cumulative impacts on wildlife.

Relative to the BLM and BIA No Action Alternatives, the contribution of management to cumulative impacts under BLM and BIA Alternative B would be lower. This would be due to enhancing the unique landscapes, while sustaining and increasing native vegetation communities and preserving and protecting cultural resources. Due to lease closures and stipulations, BLM Alternative B would contribute less to cumulative impacts on wildlife, compared with the BLM No Action Alternative.

Relative to the BLM and BIA No Action Alternatives, the contribution of management to cumulative impacts under BLM and BIA Alternative C would be approximately the same. This would be due to a strategy that balances community needs and development, while enhancing land conditions. Due to similar leasing constraints, BLM Alternative C would result in a similar contribution to cumulative impacts on wildlife, compared with the BLM No Action Alternative.

Relative to the BLM and BIA No Action Alternatives, the contribution of management to cumulative impacts under BLM and BIA Alternative D would be higher. This would be due to maximizing resources that target economic outcomes. Due to an increased amount of wildlife habitat disturbed, BLM and BIA Alternative D would result in a greater contribution to cumulative impacts on wildlife, compared with the BLM and BIA No Action Alternatives.

3.4.8 Special Status Species and Species of Special Management Concern

Affected Environment

Current Conditions

Species Listed Under the Endangered Species Act

The FFO manages habitats for special status species listed by the USFWS as candidate, endangered, threatened, or proposed for listing under the authority of the Endangered Species Act (ESA). Currently, there are nine endangered and five threatened species that occur or have the potential to occur in the counties comprising the planning area (see **Table 3-29**).

The USFWS has designated portions of BLM-managed lands in the planning area as critical habitat for the yellow-billed cuckoo, Mexican spotted owl, Rio Grande silvery minnow, razorback sucker, and Colorado pikeminnow. No habitat for Mexican spotted owl has been identified on Navajo Nation-managed lands in the planning area. Critical habitat locations are described in the biological assessment associated with the FMG RMPA/EIS.

Table 3-29
Federally Listed Species and Critical Habitat that Occur or Potentially Occur in McKinley, Rio Arriba, San Juan, and Sandoval Counties

Species	Status ¹	Comments	Known Occurrence in the Planning Area
Knowlton's cactus <i>Pediocactus knowltonii</i>	E	Endemic to New Mexico on rolling gravel hills in the pinyon-juniper/sagebrush plant community.	Yes; entire known population is in New Mexico on private land owned by the Nature Conservancy and is fenced.
Mancos milkvetch <i>Astragalus humillimus</i>	E	Found in pinyon-juniper woodlands and desert shrublands, on sandstone rimrock ledges and mesa tops in San Juan County and adjacent Colorado	Yes; all known populations in the planning area are found in ACECs.
Mesa Verde cactus <i>Sclerocactus mesae-verdae</i>	T	Found in soils derived from Mancos, Fruitland, and Lewis shale; largest population is found on Ute and Navajo Tribal lands, though other populations exist in Colorado	Yes; all known populations in the planning area are in ACECs.
Zuni fleabane <i>Erigeron rhizomatus</i>	T	Found in pinyon-juniper woodlands on steep, easily eroded, sandstone slopes and clay banks, usually in close association with the Chinle and Baca Formations	No known occurrences in the planning area
Colorado pikeminnow <i>Ptychocheilus lucius</i>	E	Inhabits sections of the San Juan River and other rivers in the Upper Colorado River Basin	No known occurrences in the planning area
Colorado pikeminnow critical habitat		Designated critical habitat consists of portions of the San Juan River, beginning at the New Mexico Highway 371 bridge in Farmington and continuing downstream to Lake Powell.	Yes; San Juan River
Razorback sucker <i>Xyrauchen texanus</i>	E	Inhabits off-channel backwaters and shallow flooded areas of the San Juan River and other rivers in the Upper Colorado River Basin	No known occurrences in the planning area; may occur/introduced

3. Affected Environment and Environmental Consequences (Special Status and Listed Species)

Species	Status ¹	Comments	Known Occurrence in the Planning Area
Razorback sucker critical habitat		Critical habitat for this species in New Mexico is in 39 miles of the lower San Juan River, where the wild population has been extirpated and is being reestablished through stocking	No known occurrences in the planning area
Rio Grande silvery minnow <i>Hybognathus amarus</i>	E	Found in pools and backwaters of creeks and rivers in the Rio Grande and Pecos River drainages in Rio Arriba and Sandoval Counties; extirpated from most historic habitat	No known occurrences in the planning area
Rio Grande silvery minnow critical habitat		Critical habitat extends from Cochiti Dam on the Rio Grande in Sandoval County, downstream 157 miles to the middle Rio Grande	No known occurrences in the planning area
Zuni bluehead sucker <i>Catostomus discobolus yarrow</i>	E	Sedentary sucker found in shady pools in low velocity runs of rivers and creeks of the Rio Nutria drainage of the Little Colorado River in McKinley County	No known occurrences in the planning area
Jemez Mountains salamander <i>Plethodon neomexicanus</i>	E	Restricted to the Jemez Mountains in Sandoval and Rio Arriba Counties, it is found in mixed coniferous forests, with rotted logs and rocks for cover	No known occurrences in the planning area
Mexican spotted owl <i>Strix occidentalis lucida</i>	T	Found in the southwestern United States, principally in New Mexico and Arizona	No known occurrences in the planning area
Mexican spotted owl critical habitat		Critical habitat present in the Mexican spotted owl ACEC	Critical habitat present; protected in ACEC
Yellow-billed cuckoo (Western Distinct Population Segment [DPS]) <i>Coccyzus americanus</i>	T	Breeding territory for Western DPS includes western New Mexico; nests in cottonwood/willow riparian habitat along rivers; rare in the San Juan River valley	No known occurrences in the planning area
Yellow-billed cuckoo critical habitat		Critical habitat is present and mapped along the San Juan River	Critical habitat present; protected in ACEC
Southwestern willow flycatcher <i>Empidonax trailii extimus</i>	E	This species is known or believed to occur in San Juan, McKinley, and Rio Arriba Counties	Yes
Southwestern willow flycatcher critical habitat		Critical habitat is in riparian corridors along the San Juan River in San Juan County (outside of the analysis area)	No known occurrences in the planning area
Canada lynx <i>Lynx canadensis</i>	T	Medium-sized cat found in boreal and montane forests; feeds primarily on snowshoe hare and other small mammals and birds; distributed through western and northern United States, into the southern Rocky Mountains	Yes; has been observed in the planning area, along the San Juan River corridor
New Mexico meadow jumping mouse <i>Zapus hudsonius luteus</i>	E	Found in wet meadows and willow zones along streams in the Jemez Mountains and in the Rio Grande watershed in Rio Arriba and Sandoval Counties	No known occurrences in the planning area

Sources: BLM 2003; NatureServe 2014; USFWS 2016

¹E = endangered, T = threatened

BLM-Sensitive Species and FFO Special Management Species

The BLM directly manages BLM-Sensitive and FFO Special Management Species (SMS) within the FFO. These species are managed by BLM so that they should not need to be listed under the ESA in the future. It is thus BLM policy to initiate proactive conservation measures that reduce or eliminate threats to BLM-sensitive species and to conserve and recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer needed for these species.

Other Species of Special Management Concern

The BLM must ensure that authorized, funded, or implemented actions do not contribute to the need to list any of these species as threatened or endangered. It also must ensure that its actions would not adversely affect the likelihood of any listed species to recover. Protecting and managing all listed species will continue to be a priority for the BLM. It will coordinate with other programs and activities as needed to meet management objectives. This includes bald and golden eagles that are protected by other laws.

Tribally Listed Species

Species classified as endangered by the Navajo Nation are protected under the Resources Committee of the Navajo Nation Council, through the NNDFW. The primary guidance documents in place to assist in protection of the Navajo Nation's endangered species are the Biological Resource Land Use Clearance Policies and Procedures (RCP) and Navajo Endangered Species List (NESL; Navajo Nation 2008a, 2008b). The RCP identifies six wildlife areas (**Figure 3-14**, Navajo Nation Wildlife Areas) within the boundaries of the reservation that help guide development to limit or avoid impacts on the listed species (Navajo Nation 2008b). The NNDFW maintains the RCP document to ensure protection of endangered, rare, and game species found on the reservation (Navajo Nation 2008b). In accordance with the Indian Self-Determination Act of 1975 (PL 93-638), the NNDFW is a 638 contractor for the BIA for listed species and is authorized to make recommendations for appropriate treatment of biological resources, with final determinations from the Regional Director of the BIA.

The Navajo Nation requires preparation of a biological evaluation (BE) if proposed development is in wildlife areas, excluding Area 4. Other exceptions to the BE requirement are found on pages 2 and 3 of the NNDFW RCP.

The Navajo Nation Natural Heritage Program's (NNHP's) Division of Natural Resources maintains the NESL species accounts (Navajo Nation 2008a). The species in the NESL are organized into four groups, as follows:

- Group 1—Species that no longer occur on the Navajo Nation
- Group 2 (G2)—Species or subspecies whose prospects of survival or recruitment are in jeopardy
- Group 3 (G3)—Species or subspecies whose prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future
- Group 4 (G4)—Species or subspecies for which the NNDFW does not currently have sufficient information to support their being listed in G2 or G3 but has reason to consider them

In 2017, the BIA consulted with the NNHP regarding the FMG RMPA/EIS. The agency received a response to this request on October 6, 2017. These species are represented in **Table 3-29**, and were identified through this consultation with the NNDFW. The list includes 21 species known to occur in the planning area and 30 additional species as having the potential to occur there. NNHP is proposing to up-list *Sclerocactus cloveriae* and *Alliella formosa* from G4 (data deficient) to G3 (threatened) in the 2019 revisions to the Navajo Endangered Species List (N. Talkington, personal communication, December 13, 2019).

State of New Mexico Listed Species

The State of New Mexico, through the New Mexico Department of Game and Fish, maintains a list of threatened and endangered species of New Mexico. It also maintains a list of species of greatest conservation

concern, which is a part of the state wildlife action plan (New Mexico Department of Fish and Game 2016a, 2016b). The New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) Forestry Division has statutory responsibility for maintaining and updating the list of state endangered plant species (EMNRD 2017). A current and up-to-date list of all (235) rare and endangered plants is provided by the New Mexico Rare Plant Conservation Strategy (Strategy; EMNRD 2017). The Strategy list is maintained and updated by the Rare Plant Conservation Strategy Partnership, which includes the BLM (EMNRD 2017). In addition, the Strategy provides a map of Important Plant Areas (IPAs) in New Mexico, including IPAs within the BLM Farmington resource management area. **Figure 3-15**, Important Plant Areas, depicts a map of IPAs within the Farmington resource area. These are areas of high significance for plant conservation and may be considered for Conservation Opportunity Areas. Details of the process and the Strategy Scorecard can be found online at: <http://www.emnrd.state.nm.us/SFD/ForestMgt/NewMexicoRarePlantConservationStrategy.html>.

The BLM, Navajo Nation, and State of New Mexico listed species known to occur or with the potential to occur in the planning area are listed in **Table 3-30**.

Table 3-30
FFO Special Management Species, BLM-Sensitive, State of New Mexico, and Navajo Nation Species Known to Occur or Potential to Occur in the Planning Area

Species	Status ¹			Habitat Description	Known or Potential to Occur
	BLM	State	Navajo		
Plants					
Aztec gilia <i>Aliciella formosa</i>	Sensitive, SMS	E	G4	Grows in salt desert shrublands on soil from the Nacimiento Formation; known from San Juan County in New Mexico in the planning area in the tri-cities area	Known
Acoma fleabane <i>Erigeron acomanus</i>	None	SOC	G3	Sandy slopes and benches of the Entrada Formation capped by limestone	Potential
Clover's cactus <i>Sclerocactus cloverae</i>	Sensitive	None	None	Grows in sandy clay strata of the Nacimiento Formation in sparse shadscale scrub at 5,000–6,400 feet	Known
Mancos saltbush <i>Proatriplex pleiantha</i>	Sensitive	SOC	None	Desert badlands in saline clay soils of the Mancos and Fruitland shale formations; found in clay slopes of mesas and barren clay flats	Known
Mancos milkvetch <i>Astragalus humillimus</i>	USFWS	E	G2 ²	Cracks or eroded depressions on sandstone rimrock ledges and mesa tops in Point Lookout sandstone	Known; all known populations are within The Hogback ACEC
Mesa Verde cactus <i>Sclerocactus mesae-verdae</i>	USFWS	T	G2 ²	Found in soils derived from Mancos, Fruitland, and Lewis shale; largest population is found on Ute and Navajo Tribal lands, though other populations exist in Colorado.	Known; all known populations are within The Hogback ACEC

3. Affected Environment and Environmental Consequences (Special Status and Listed Species)

Species	Status ¹			Habitat Description	Known or Potential to Occur
	BLM	State	Navajo		
Naturita milkvetch <i>Astragalus naturitensis</i>	None	SOC	G3 ²	Sandstone ledges and rimrock along canyons in pinyon-juniper woodlands	Potential
Parish's alkali grass <i>Puccinellia parishii</i>	Sensitive	SOC	G4	Alkaline springs, seeps, and seasonally wet areas that occur at the heads of drainages or on gentle slopes	Potential
San Juan milkweed <i>Asclepias sanjuanensis</i>	Sensitive	SOC	G4	Found in sandy loam soils, usually in disturbed sites, in juniper savanna and Great Basin Desert scrub, at 5,000 to 5,500 feet	Known
Sivinski's blazingstar <i>Mentzelia sivinskii</i>	Sensitive	SOC	None	Found in road cuts and barren hillsides on gray to red shales and clays of the Mancos and Chinle formations in pinyon-juniper woodland, at 5,900 to 7,200 feet	Known
Birds					
American dipper <i>Cinclus mexicanus</i>	None	None	G3	Found in and around flowing water and riparian areas	Potential
American peregrine falcon <i>Falco peregrinus anatum</i>	SMS	T, SGCN	G4	Nests in New Mexico; this and the arctic subspecies both migrate through the state; there are at least three nest sites in the planning area.	Known
Bald eagle <i>Haliaeetus leucocephalus</i>	Sensitive, SMS, Bald and Golden Eagle Protection Act	T, SGCN	G2 ²	Widespread distribution, found throughout North America, nesting in tall trees or on cliffs; breeding habitat most commonly includes areas close to the coast, bays, rivers, lakes, reservoirs, or other bodies of water with available food sources: fish, waterfowl, and seabirds.	Known
Bendire's thrasher <i>Toxostoma bendirei</i>	Sensitive	SGCN	None	Found in sparse desert habitats, from sea level to 5,900 feet; for breeding, favor relatively open grassland, shrubland, or woodland, with scattered shrubs or trees; not found in dense vegetation	Known
Ferruginous hawk <i>Buteo regalis</i>	SMS	None	G3 ²	Breeds from the Canadian provinces south to New Mexico in grassland habitat; one or two known active nesting territories in the planning area	Known

3. Affected Environment and Environmental Consequences (Special Status and Listed Species)

Species	Status ¹			Habitat Description	Known or Potential to Occur
	BLM	State	Navajo		
Golden eagle <i>Aquila chrysaetos</i>	SMS, Bald and Golden Eagle Protection Act	None	G3 ²	Generally, inhabits open and semi-open country, such as prairies, sagebrush, arctic and alpine tundra, savannah or sparse woodland, and barren areas, especially in hilly or mountainous regions, in areas with sufficient mammalian prey base, and near suitable nesting sites	Known
Mexican spotted owl <i>Strix occidentalis lucida</i>	USFWS	SGCN	G3 ²	Mixed-conifer and Madrean pine-oak forests; steep slopes, rocky cliffs	Potential; designated USFWS critical habitat within the BLM Mexican Spotted Owl ACEC.
Mountain plover <i>Charadrius montanus</i>	SMS	SGCN	G4 ²	Found in high plains/shortgrass prairie, desert tablelands, and sagebrush habitats; commonly associated with prairie dog towns	Known
Osprey <i>Pandion haliaetus</i>	SMS	None	None	Found in Douglas-fir, hemlock-Sitka spruce, redwood, ponderosa pine, larch/white pine, lodgepole pine, fir-spruce, aspen (hardwoods), chaparral, and pinyon-juniper forest types; constructs nests in broken-topped trees and snags and on artificial platforms; subsists almost entirely on fish; nine monitored nests are in the decision area ⁴	Known
Peregrine falcon <i>Falco peregrinus</i>	SMS	T, SGCN	G4 ²	Prefer wide-open spaces, and thrive near coasts where shorebirds are common, but they can be found everywhere from tundra to deserts.	Known
Pinyon jay <i>Gymnorhinus cyanocephalus</i>	Sensitive	SGCN	None	Pinyon-juniper woodland, less frequently pine; in nonbreeding season, in scrub oak and sagebrush	Known

⁴ John Kendall, BLM FFO Wildlife Biologist, personal communication with Dan Morta, EMPSi Biological Specialist. February 2018.

3. Affected Environment and Environmental Consequences (Special Status and Listed Species)

Species	Status ¹			Habitat Description	Known or Potential to Occur
	BLM	State	Navajo		
Prairie falcon <i>Falco mexicanus</i>	SMS	None	None	Primarily open situations, especially in mountainous areas, steppe, plains, and prairies; typically nests in well-sheltered ledge on rocky cliff or steep earth embankment, 30 to more than 300 feet aboveground	Known
Southwestern willow flycatcher <i>Empidonax traillii extimus</i>	USFWS	E, SGCN	G2 ²	Require moist microclimatic and vegetative conditions and breed only in dense riparian vegetation near surface water or saturated soil	Known (migration)
Virginia warbler <i>Oreothlypis virginiae</i>	Sensitive	SGCN	None	Breeds in open pinyon-juniper and oak woodlands, often on steep slopes with shrubby ravines	Known
Western burrowing owl <i>Athene cunicularia</i>	Sensitive, SMS	SGCN	G4	Breeds in much of the western United States and Canada; populations in New Mexico consist of breeding and wintering birds; nests in grasslands and desert scrub habitats in association with prairie dogs or other burrowing rodents; present in the planning area	Known
Yellow-billed cuckoo <i>Coccyzus americanus</i>	USFWS	SGCN	G2 ²	Variety of riparian habitats; cottonwood and willow trees for foraging. Require large blocks of riparian habitat for nesting.	Known
Fish					
Colorado pikeminnow <i>Ptchocheilus lucius</i>	USFWS	E, SGCN	G2 ²	Restricted to large rivers of the Colorado River Basin, formerly in the mainstream Colorado River and major tributaries (Gunnison, White, Yampa, Dolores, San Juan, Uncompahgre, Animas, and Green Rivers), from Mexico and Arizona to Wyoming. Present distribution drastically reduced from original.	Known
Razorback sucker <i>Xyrauchen texanus</i>	USFWS	SGCN	G2 ²	Found historically throughout the Colorado River Drainage, this fish has become very rare above the Grand Canyon. In Colorado, recent specimens have been taken only from the lower, mainstem Colorado, Gunnison, lower Yampa, and Green Rivers.	Known
Roundtail chub <i>Gila robusta</i>	None	E, SGCN	G2 ²	Occurs in moderate-sized to larger rivers throughout the Colorado River Basin	Potential

3. Affected Environment and Environmental Consequences (Special Status and Listed Species)

Species	Status ¹			Habitat Description	Known or Potential to Occur
	BLM	State	Navajo		
Amphibians					
Northern leopard frog <i>Lithobates (Rana) pipiens</i>	Sensitive	SGCN	G2 ²	Inhabits a variety of aquatic habitats that include slow-moving or still water along streams and rivers, wetlands, permanent or temporary pools, beaver ponds, etc.	Potential
Invertebrates					
Monarch butterfly <i>Danaus plexippus plexippus</i>	Sensitive	None	None	Breeds exclusively on milkweed	Known
Mammals					
Gunnison's prairie dog <i>Cynomys gunnisoni</i>	Sensitive	SGCN	None	High mountain valleys and plateaus at elevations of 6,000 to 12,000 feet; open or slightly brushy country, scattered junipers, and pines; burrows usually on slopes or in hummocks; found in the planning area	Known
Pronghorn <i>Antilocapra americana</i>	None	None	G3 ²	Primarily open and arid landscapes; sagebrush, grassland regions and deserts	Known
Spotted bat <i>Euderma maculatum</i>	Sensitive	T, SGCN	None	Occurs in the western United States, with historical records from all counties in the planning area; found mostly in forested habitat and lower elevation sites; detected once in the planning area and once on the Jicarilla Ranger District	Known
Townsend's big-eared bat <i>Plecotus townsendii pallescens</i>	Sensitive	SGCN	G4 ²	Occurs in the western United States, including the western half of New Mexico; commonly found in caves and mines; captured at two locations in the planning area	Known

Sources: BLM 2003, 2008a, 2018a, 2018b; USFWS 2016, 2018; Navajo Nation 2008a

¹E = endangered, T= threatened, SMS = FFO Special Management Species, SGCN = Species of Greatest Conservation Need, SOC = Species of Concern

²Navajo Nation Species identified through 2017 consultation.

Trends

Species diversity and abundance are directly related to maintaining habitat availability, diversity, and quality. The species listed above all have specialized habitat requirements. Many of these habitat types have been drastically altered or reduced from their historical native ranges.

Continuing threats to native ecosystems and species diversity in the planning area include fragmentation and loss of critical or important habitat due to human activities. The cumulative impact from all disturbances poses a risk to these species. Additionally, invasive species may continue to displace native vegetation, which indirectly affects the distribution and populations of wildlife. Displacement of native vegetation may also contribute to the loss of pollinators and supporting habitat for plants.

There are a variety of threats associated with the decline of rare plants in the planning area: oil and gas development and associated infrastructure, disease and predation, nonnative noxious and invasive species, OHVs, livestock grazing, and fragile soils. New oil and gas development is expected in the listed species' habitat (Nacimiento Formation; Muldavin et al. 2016). This could negatively affect rare plants in these areas.

Environmental Consequences

BLM Alternatives

Impacts Common to All BLM Alternatives

Under all BLM alternatives, compliance with Section 7 of the ESA would be required for federally listed species and the ecosystems upon which they depend. This would mitigate impacts on these species regardless of the management considered in the FMG RMPA/EIS.

Lands with Wilderness Characteristics

Management of lands with wilderness characteristics would not independently contribute to impacts on special status or listed species. Restrictions on fluid mineral and ROW development in lands managed to protect wilderness characteristics as a priority over other multiple uses are included in the overall discussion of impacts from fluid minerals and lands and realty management under each alternative. For these reasons, lands with wilderness characteristics management are not discussed further in this section.

Fluid Minerals

Under all BLM alternatives, existing NSO stipulations would be applied to new oil and gas leases in the core areas of Bald Eagle ACEC (winter areas). This management would reduce impacts associated with fluid mineral exploration and development, resulting in the maintenance of acreage or quality of habitat for bald eagles.

The operation of equipment associated with fluid mineral development would also create noise that would result in effects on special status and listed species wildlife physiology and behavior, as described in *Nature and Type of Effects* in the Environmental Consequences Supplemental Report, Section EC.2.7, Wildlife.

Impacts Common to All BLM Action Alternatives

Lands and Realty

Under all BLM Action Alternatives, removal of or damage to hardwood trees with a diameter of 8 inches or more or any ponderosa pine, Douglas-fir, or aspen tree would not be allowed. Retaining these trees would indirectly reduce impacts on some listed species that utilize the trees for nesting, breeding, and perching.

BLM No Action Alternative

Vegetation Management

The BLM would not apply TL stipulations specific to vegetation treatment or noise levels in active pinyon jay colonial nest sites. Impacts on pinyon jay nest sites would be similar to those described for migratory birds in **Section 3.4.7**. They would include a reduction in acreage or quality of habitats, fragmentation, and direct mortality of individuals. Impacts would also include the potential for physiological stress in individuals.

Under the BLM No Action Alternative, vegetation treatments in Gunnison's prairie dog towns would be avoided and BMPs would could be implemented if avoidance were not possible. Impacts on Gunnison's prairie dog towns from management under the BLM No Action Alternative would result in a short-term reduction in the acreage or quality of habitats; however, prairie dog towns are nesting habitat for burrowing owls, and current management protects both species (according to a 2008 BLM Special Management Species IM).

Four months of TL restrictions would apply within 0.33 miles of an active or historical prairie falcon, peregrine falcon, or ferruginous hawk nest. Such restrictions would reduce the likelihood for direct disturbance to these nesting species associated with vegetation treatments. Management under the 2002

Biological Assessment for the 2003 RMP would be followed. For newly or future listed species, the USFWS survey requirements and regulations would apply.

Under BLM No Action Alternative, vegetation projects within habitat for Clover's cactus (*Sclerocactus cloverae*) and Aztec gilla (*Aliciella formosa*) would require a biologic survey and if habitat or individual plants are identified then the project would be relocated or not conducted. Direct impacts on these two species would be reduced through surveys and avoidance of specific habitat. Indirect impacts may include exposure to weed spraying chemicals, if the vegetation treatments don't allow for the appropriate amount of buffer. Other indirect impacts may include introduction of weed species from surrounding areas where vegetation treatments may be conducted. These impacts would be reduced by proper application of BMPs and selection of key areas for vegetation treatments that would have avoid habitat for these species.

The BLM would not designate PCAs under BLM No Action Alternative. Management of federally listed plant species within the acreage identified for these PCAs would continue under established ACECs. There are no anticipated impacts on federally listed species under BLM No Action Alternative within these established ACECs as they have existing stipulations for protection.

Lands with Wilderness Characteristics

Under BLM No Action Alternative, lands managed to protect wilderness characteristics would not be managed as a priority over other multiple uses. Special status species would not receive indirect protection within these areas.

Lands and Realty

No ROW avoidance areas would be designated. Impacts on special status and listed species from ROW development could include a reduction in the acreage or quality of special status and listed species habitat if the BLM did not use its discretion to locate ROWs to avoid this habitat.

Fluid Minerals

The BLM would continue the current management direction and prevailing conditions derived from existing planning documents, including adhering to the tenets of the mitigation hierarchy as defined in CEQ NEPA (40 CFR 1508.20) regulations. It would not designate PCAs and would not apply stipulations in occupied or suitable habitat for special status or listed plant species. As a result, disturbance associated with fluid mineral exploration and development could reduce the acreage and quality of listed species' habitat and could result in damage or direct mortality of special status plants.

For proposed projects in special status or listed species habitat, a biological survey would be required, and disturbance minimization measures would be applied. These measures would mitigate impacts on listed species.

Impacts on special status or listed species under the BLM No Action Alternative may occur in areas outside of mapped potential habitat. This would be the case if surveys for special status or listed plant species were conducted outside of the blooming season or if surveys were not conducted by a qualified botanist. Potential impacts would include a reduction in the acreage or quality of habitats, direct mortality to individuals from disturbance activities, and direct and indirect damage or mortality due to increased dust deposition, fragmentation, and disturbance of pollinator habitat; a reduction of seed dispersion; and introduction of competitive, nonnative plants.

BLM Alternative A

Vegetation Management

Under BLM Alternative A, the BLM would focus on managing and enhancing habitats in its decision areas. Four PCAs, totaling 6,800 acres, would be designated under BLM Alternative A (Figure 2-4; Appendix A). The BLM management priority for these PCAs is to provide conservation to federally listed native plants and their habitat. The total acreage is subject to change based on future identification of listed plant species

and habitat. Management of these PCAs would include NSO stipulations and ROW exclusions, applicable to new leases and LUAs.

Application of these stipulations in the PCAs would reduce direct impacts on federally listed plants within the 6,800 acres. Areas outside the PCAs would require biological surveys prior to vegetation management activities; listed species and habitat would be avoided, disturbance would be minimized, and/or other operation constraints would be applied. Avoidance would reduce direct impacts on listed species and their habitat. Minimizing disturbance would lessen impacts; however, indirect impacts on the species could occur if vegetation treatments are not properly placed. Indirect impacts may include exposure to chemical weed spray and introduction of noxious weeds. Through survey requirements and operation constraint, indirect impacts would be reduced.

Under BLM Alternative A, vegetation treatments would be restricted within 0.6 miles of active pinyon jay colonial nest sites from April 1 through August 1. Noise levels would not exceed 48.6 A-weighted decibel (dBA) at the edge of the active nesting colony. Compared with the BLM No Action Alternative, there would be a reduced potential for impacts on pinyon jay colonial nests, such as a reduction in the acreage or quality of habitats, fragmentation, direct mortality, and potential for physiological stress in individuals.

Four months of TL stipulations, restrictions on vegetation treatments, and prohibitions on ROW construction would restrict activities within 0.33 miles of an active or historical ferruginous hawk, prairie falcon, or peregrine falcon nest. These activities would be restricted within 0.25 miles of osprey nests over a five-month period. Compared with the BLM No Action Alternative, impacts on raptor nests would be fewer because impacts would be decreased by the longer time periods for restrictions.

Lands and Realty

The BLM would designate ROW exclusion and avoidance areas to reduce surface impacts in occupied and/or suitable habitat for ESA-listed special status plants. Such management would reduce the potential for impacts on listed species from fluid mineral exploration and development and ROW development; this would maintain the acreage and quality of listed species' habitats and reduce the risk for damage and mortality to a greater extent than under the BLM No Action Alternative.

The BLM would establish ROW avoidance areas around occupied and/or suitable habitat for listed plant species, eagle nests, raptor nest sites, burrowing owl nesting habitat, pinyon jay nest sites, Gunnison's prairie dog colonies, and listed bat species habitat. Compared with the BLM No Action Alternative, there would be fewer impacts, such as habitat modification, degradation, fragmentation, and removal due to ROW siting authorizations.

Under BLM Alternative A, special status or listed plant species clearance surveys will be required to be completed before any surface-disturbing activities are approved in or next to special status plant species' potential, suitable, or occupied habitats. Application of these survey requirements and stipulations would reduce impacts on special status or listed plant species' potential, suitable, or occupied habitats when compared with the BLM No Action Alternative.

Fluid Minerals

Special status and listed species' habitat would be protected from degradation, modification, and removal associated with proposed projects. Compared with the BLM No Action Alternative, impacts would be reduced, due to clearance surveys and the implementation of requirements for avoidance and restriction of activities that could affect populations.

A CSU stipulation would be applied to oil and gas leases within 165 feet (50 meters) of the boundary of Gunnison's prairie dog towns and BMPs could be applied to reduce impacts. Similarly, vegetation treatments would not be permitted within 165 feet (50 meters) of Gunnison's prairie dog towns. Compared with the BLM No Action Alternative, impacts on Gunnison's prairie dog towns from habitat modification, degradation,

fragmentation, and removal would be reduced under BLM Alternative A. Direct mortality would be less likely.

Timing limitations would prohibit construction, drilling, completion, and workover activities within 3,168 feet (0.6 miles) of active pinyon jay colonial nest sites from March 1 to August 1. Noise levels should not exceed 48.6 dBA at the edge of the active nesting colony. This stipulation does not apply to operation and maintenance of production facilities or emergency situations, unless otherwise specified. Surveys for pinyon jay colonies would be conducted prior to construction. Compared with the BLM No Action Alternative, impacts on pinyon jay colonial nest sites would be reduced. However, impacts on nesting habitat may occur outside of the timing limitation dates, since nest locations and habitat may be undetected and removed when the birds are not present.

Under BLM Alternative A, project proponents in designated burrowing owl nesting habitat would be required to survey for them from April 1 through August 15. Disturbance restriction zones would be applied around occupied nests. Compared with the BLM No Action Alternative, impacts on burrowing owl nests would be fewer.

The BLM would apply an NSO stipulation in yellow-billed cuckoo and southwestern willow flycatcher habitat and MSO suitable habitat. This management would reduce modification and removal of habitat compared with the BLM No Action Alternative. Additionally, vegetation treatments in these areas would be restricted. In addition, nesting habitat for MSO, southwestern willow flycatcher, and yellow-billed cuckoo are protected within the River Tracts ACEC. Accordingly, any proposed activity within or near suitable nesting habitat will be subject to Section 7 consultation under the ESA.

Under BLM Alternative A, applying an NSO stipulation in all designated and proposed critical habitat for federally listed species would prevent habitat alteration and removal from surface disturbance activities. Compared with the BLM No Action Alternative, impacts on designated and proposed critical habitat for federally listed species would be less likely to occur.

The BLM would also apply a CSU stipulation in special status bat species habitat. While special status bat species are not known to exist in the planning area at this time, this stipulation would protect bats from disturbance if such habitat is identified in the future.

BLM Alternative B (Including BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

Vegetation Treatments

The BLM would not designate PCAs. Impacts on federally listed plant species habitat and individual plants in these areas would be the same as under the BLM No Action Alternative.

Under BLM Alternative B, the BLM would require biological surveys prior to conducting vegetation treatments within special status plant species habitat and the project would be located if habitat or individual plants are identified. Direct impacts would be avoided, if the vegetation treatments are relocated outside the habitat. Indirect impacts may include exposure to chemical weed spray and introduction of weeds. These indirect impacts would be lessened through operational constraints. Beneficial indirect impacts may include weed control in surrounding areas that would lessen the likeliness of weeds invading the listed species habitat.

Management of vegetation treatments and oil and gas leasing in Gunnison's prairie dog towns and associated impacts under BLM Alternative B would be the same as under BLM Alternative A.

In addition, the impacts on special status species as well as native plants from mechanical or surface-disturbing vegetation treatments in lands managed to protect wilderness characteristics would be the same as those under BLM Alternative A.

Impacts on burrowing owl nests, yellow-billed cuckoo or southwestern willow flycatcher nesting habitat, MSO suitable habitat, and special status bat species habitat would be the same as described for BLM Alternative A.

Under BLM Alternative B, special status species management would reduce impacts on pinyon jay colonial nests, as described for BLM Alternative A. Impacts of TL stipulations and other timing restrictions for golden or bald eagle and raptor nests would be the same as under BLM Alternative A.

Management of vegetation treatments would result in the same impacts on designated and proposed critical habitat for federally listed species as described for BLM Alternative A.

Lands and Realty

Impacts of ROW avoidance areas would be similar to those described under BLM Alternative A except that special status and listed plant species habitat would not receive restrictive management. Overall, compared with the BLM No Action Alternative, there would be fewer impacts, such as habitat modification, degradation, fragmentation, and removal due to ROW siting authorizations.

For proposed projects within or adjacent to suitable habitat for special status plant, a biological evaluation would be required to determine the level of surveys required, including survey boundary. When suitable habitat for these plants are documented within proposed project area, avoidance, minimization, or relocation of the proposed project would be explored to minimize disturbance. Direct impacts, such as destruction of individual plants or suitable habitat, would be reduced by relocating the project. Indirect impacts may include modification and fragmentation of surrounding or adjacent habitat that can introduce undesirable weed species and degrade habitat for special status plants.

Fluid Minerals

BLM Sub-Alternatives B1 and B2

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), BLM Alternative B includes two sub-alternatives that propose varied fluid mineral leasing management. The varied management particularly changes in the proximity of the CCNHP. BLM Sub-Alternatives B1 and B2 respectively include fluid mineral leasing closures from miles 0-10 and miles 0-15. When compared with the BLM No Action Alternative, the areas closed to leasing by BLM in their mineral decision area under BLM Sub-Alternatives B1 and B2 would increase by 566 percent and 657 percent, respectively.

Areas open to leasing with mapped leasing stipulations under BLM Sub-Alternatives B1 and B2 would also change when compared with the BLM No Action Alternative. Areas open to leasing with standard terms and conditions would respectively decrease under BLM Sub-Alternatives B1 and B2 by 74 percent and 75 percent.

Areas open to leasing with NSO stipulations would respectively increase under BLM Sub-Alternatives B1 and B2 by 603 percent and 554 percent. Areas open to leasing with CSU stipulations would decrease by 20 percent for BLM Sub-Alternative B1 and would decrease by 26 percent for BLM Sub-Alternative B2. Areas open to leasing with TL stipulations under BLM Sub-Alternatives B1 and B2 would decrease by 59 percent and 61 percent, respectively.

Under BLM Sub-Alternatives B1 and B2, the closures, NSOs, and CSUs would indirectly provide protection for wildlife, thereby reducing potential impacts on wildlife within those areas.

Timing limitations would prohibit construction, drilling, completion, and workover activities within 3,168 feet (0.6 miles) of active pinyon jay colonial nest sites from March 1 to August 1. Noise levels should not exceed 48.6 dBA at the edge of the active nesting colony. This stipulation does not apply to operation and maintenance of production facilities or emergency situations, unless otherwise specified. Surveys for pinyon jay colonies would be conducted prior to construction. Compared with the No Action Alternative, impacts on pinyon jay colonial nest sites would be reduced. However, impacts on nesting habitat may occur outside

of the timing limitation dates, since nest locations and habitat may be undetected and removed when the birds are not present.

Overall impacts of oil and gas development on special status and listed species habitat and individuals would be reduced compared with the No Action Alternative because of the additional stipulations specific to special status and listed species and other closures and NSO stipulations that would reduce the amount of surface disturbance and habitat fragmentation in the BLM surface decision area. Habitat loss and mortality could still occur in areas not subject to specific protections.

BLM Alternative C (Includes BLM Sub-Alternatives C1–C6; applying only to Fluid Minerals)

Vegetation Treatments

Under this alternative, the BLM would not designate PCAs. Impacts on federally listed plant species in these areas (6,800 acres) would be the same as under the BLM No Action Alternative.

Under BLM Alternative C, impacts on special status plant species from vegetation treatments would be similar to those described under BLM Alternative B; however, survey requirements would be less stringent.

Under BLM Alternative C, impacts on pinyon jay from vegetation treatments would be similar to those described under BLM Alternative B; however, the protected area around colonial nest sites would be smaller. Compared with the BLM No Action Alternative, there would be a reduced potential for impacts on pinyon jay colonial nests, such as habitat disturbance, loss, reduced habitat effectiveness, fragmentation, and direct mortality. Similarly, vegetation treatments would not be permitted in Gunnison's prairie dog towns.

Impacts of TL stipulations and other timing restrictions for golden or bald eagle and raptor nests would be the same as under BLM Alternative A.

Impacts of management on burrowing owl nests, yellow-billed cuckoo and southwestern willow flycatcher nesting habitat, MSO suitable habitat, and special status bat species habitat would be the same as under BLM Alternative A.

Lands and Realty

Under BLM Alternative C, ROW avoidance areas would be managed on 5,900 acres (less than 1 percent) of BLM-managed surface lands. This would include avoidance of hardwood trees, ponderosa pine, Douglas-fir, and aspen trees. Avoiding disturbance to these tree species would reduce impacts on certain special status and listed species that use them for breeding, nesting, roosting, and perching.

Eagle nests (bald and golden eagle); raptor nest sites; burrowing owl nesting habitat; migratory bird nests; and known special status bat species roosts, hibernacula, or USFWS confirmed special status bat species habitat would also be managed as ROW avoidance. Avoidance of these nesting sites and bat habitat would reduce direct impacts on these species from development of lands and realty. Indirect impacts from development of lands and realty outside of these ROW avoidance areas may include short-term avoidance of the areas during construction and long-term impacts from alterations of foraging habitat.

Impacts on special status plant species through land and realty development would be the same as under BLM Alternative B.

Fluid Minerals

BLM Sub-Alternatives C1–C6

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), BLM Alternative C includes six sub-alternatives that propose varied fluid mineral leasing management. The varied management particularly changes in the proximity of the CCNHP. For example, BLM Sub-Alternatives C1 to C5 respectively include NSO stipulations around the CCNHP from miles 0-2, miles 0-4, miles 0-6, miles 0-8, and miles 0-10, and BLM Sub-Alternative C6 proposes a fluid mineral leasing closure from miles 0-4 and NSO stipulations from miles 4-6. When compared with the BLM No Action Alternative, the areas closed to

leasing in the BLM mineral decision area under BLM Sub-Alternatives C1–C5 would remain the same, while the areas closed to leasing by the BLM under Sub-Alternative C6 would increase by 41 percent.

Areas open to leasing with mapped leasing stipulations under the sub-alternatives would also change when compared with the BLM No Action Alternative. Areas open to leasing with standard terms and conditions would respectively decrease under BLM Sub-Alternatives C1–C6 by 7 percent, 10 percent, 14 percent, 19 percent, 24 percent, and 14 percent. Areas open to leasing with NSO stipulations would respectively increase under BLM Sub-Alternatives C1–C6 by 60 percent, 93 percent, 133 percent, 188 percent, 253 percent, and 87 percent. Areas open to leasing with CSU stipulations would increase by 3 percent for all BLM Alternative C sub-alternatives, and areas open to leasing with TL stipulations would remain the same for all BLM Alternative C sub-alternatives.

For proposed projects in potential, suitable, or occupied special status or listed plant species habitat, management impacts would be the same as under the BLM No Action Alternative.

A CSU stipulation would be applied to oil and gas leases within the boundary of Gunnison’s prairie dog towns and BMPs would be applied to reduce impacts. Compared with the BLM No Action Alternative, impacts on Gunnison’s prairie dog towns from habitat modification, degradation, and removal would be reduced under BLM Alternatives C1 through C5. Direct mortality would be less likely.

Under all BLM Sub-Alternatives C1–C6, timing limitations would be implemented to prohibit construction, drilling, completion, and workover activities within 1,640 feet (500 meters) of active pinyon jay colonial nest sites from March 1 to August 1. Noise levels should not exceed 48.6 dBA at the edge of the active nesting colony. This stipulation does not apply to operation and maintenance of production facilities or emergency situations, unless otherwise specified. Surveys for pinyon jay colonies would be conducted prior to construction. Compared with the No Action alternative, impacts on pinyon jay colonial nest sites would be reduced. However, impacts on nesting habitat may occur outside of the timing limitation dates, since nest locations and habitat may be undetected and removed when the birds are not present.

Overall impacts from oil and gas development on listed species habitat and individuals would be similar compared with the No Action Alternative. This is because while some of the increased NSO stipulations and TL and CSU stipulations would apply in habitat for certain species, the total amount of surface disturbance and habitat fragmentation throughout the BLM surface decision area is likely to be similar to that under the BLM No Action Alternative. This could result in the risk of mortality and habitat loss in areas not subject to specific protections.

BLM Alternative D

Vegetation Treatments

Under its Alternative D, the BLM would not designate PCAs. Impacts on federally listed plant species in these areas would be the same as under the BLM No Action Alternative.

Under BLM Alternative D, impacts on special status plant species from vegetation treatments would be the same as described under BLM Alternative C.

Under BLM Alternative D, impacts of vegetation treatments around active pinyon jay colonial nest sites would be similar to those under BLM Alternative C except that areas adjacent to nest sites would not be protected from these treatments. Compared with the BLM No Action Alternative, there would be a reduced potential for impacts on pinyon jay colonial nests, such as habitat disturbance, loss, reduced habitat effectiveness, fragmentation, and direct mortality. There would also be reduced potential for physiological stress in individuals.

Impacts on Gunnison’s prairie dogs would be the same as under the BLM No Action Alternative.

Impacts on burrowing owls and yellow-billed cuckoo or southwestern willow flycatcher nesting habitat and MSO suitable habitat would be the same as under the BLM No Action Alternative.

Lands and Realty

Under BLM Alternative D, ROW avoidance areas would be managed on 5,900 acres (less than 1 percent) of BLM-managed surface lands. This would include avoidance of hardwood trees, ponderosa pine, Douglas-fir, and aspen trees, with the same impacts as those described under BLM Alternative C.

Additionally, the BLM would manage as ROW avoidance around eagle and migratory bird nests. Compared with the BLM No Action Alternative, there would be fewer impacts, such as those from habitat modification, degradation, fragmentation, and removal due to ROW siting authorizations.

Impacts on special status plant species through land and realty development would be the same as under BLM Alternative B.

Fluid Minerals

Under BLM Alternative D, the BLM would continue to comply with the MBTA but would not apply special stipulations in migratory bird habitat. Compared with the BLM No Action Alternative, impacts on raptor nests would be more likely to occur because there would be no TL stipulations or other timing restrictions. Impacts could include removing nesting habitat and nests. Direct mortality to individuals would occur if nests are removed or disturbed while the nest is occupied.

Under BLM Alternative D, timing limitations would be implemented to prohibit construction, drilling, completion, and workover activities within active pinyon jay colonial nest sites from March 1 to August 1. Noise levels should not exceed 48.6 dBA at the edge of the active nesting colony. This stipulation does not apply to operation and maintenance of production facilities or emergency situations, unless otherwise specified. Surveys for pinyon jay colonies would be conducted prior to construction. Compared with the No Action alternative, impacts on pinyon jay colonial nest sites would be reduced. However, impacts on nesting habitat may occur outside of the timing limitation dates, since nest locations and habitat may be undetected and removed when the birds are not present.

Overall impacts from oil and gas development on special status or listed species habitat and individuals would be similar to those under the BLM No Action Alternative. The total amount of surface disturbance and habitat fragmentation throughout the BLM surface decision area is likely to be similar to that under the BLM No Action Alternative, which could result in the risk of mortality and habitat loss in areas not subject to specific protections.

BIA Alternatives

Impacts Common to All BIA Alternatives

Under all BIA alternatives, the BIA would not apply stipulations to directly protect special status or listed species. The Navajo Nation would require preparation of a BE if the proposed development falls within wildlife areas. Exceptions to this requirement are listed in the NNDFW RCP. Conditional criteria notes detailed in the consultation letter between the BIA and NNHP-NNDFW regarding the FMG RMPA/EIS provide additional guidance for raptors. Impacts from surface disturbance associated with oil and gas development would include a reduction in the acreage or quality of habitats.

Under all BIA alternatives, additional surface disturbance from oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative. This surface disturbance would impact special status or listed species habitat as described under *Impacts Common to All BLM Alternatives*.

BIA No Action Alternative

The BIA would continue to implement current management direction contained in existing laws, regulations, policies, and standards. It would continue to limit vehicular access for well sites to approved access roads and would continue to apply setbacks from structures and water bodies. This would continue to limit surface disturbance associated with new roads and facilities and could limit the loss in acreage or quality of special

status or listed species' habitats. Such management would also limit impacts on Navajo Nation RCP wildlife areas in some instances.

There are no stipulations for the lessee to develop and implement measures to control lighting and light resulting from flaring on well sites and off-site facilities. Without measures to control light and lighting, special status or listed birds and wildlife would be affected by altering behaviors for foraging, reproduction, communication, and other critical behaviors.

BIA Alternative A

This alternative would establish the greatest number and extent of specific measures designed to protect or enhance resource values. Under BIA Alternative A, surface disturbance would be minimized by allowing roads, utilities, and pipelines to share common ROWs. Such management would reduce surface disturbances and retain the acreage and quality of special status or listed species' habitats. It also would reduce the likelihood for habitat fragmentation and would limit impacts on Navajo Nation RCP wildlife areas in some instances. This management would reduce impacts, compared with the BIA No Action Alternative.

Requiring interim reclamation and applying larger setbacks from structures and water bodies could reduce the levels of surface disturbance projected under this alternative, compared with the BIA No Action Alternative. This would result in less potential for a reduction in acreage or quality of special status or listed species' habitats and reduced impacts on Navajo Nation RCP wildlife areas.

Under BIA Alternative A, the lessee would develop and implement measures to control lighting and light resulting from flaring on well sites and off-site facilities. The lighting measures would consider sensitive wildlife habitat and nest locations and could include down lighting, flare shielding, and alternate lighting colors. Compared with the BIA No Action Alternative, controlling light and lighting would reduce the effects of lighting on special status or listed wildlife and bird foraging, reproduction, and communication.

BIA Alternative B

Under BIA Alternative B, special status or listed species would be managed to give priority to protecting cultural resources. Directional drilling may be required and, where practical, wells would be collocated to reduce road, well pad, and surface disturbance. Surface disturbance would also be minimized by allowing roads, utilities, and pipelines to share common ROWs, with the same impacts described under BIA Alternative A. Short-term and long-term impacts, such as those from habitat avoidance and fragmentation, would also be reduced, relative to the BIA No Action Alternative.

Under BIA Alternative B, artificial lighting would not be managed specifically to limit impacts on wildlife; however, controlling light and lighting to protect key viewsheds would indirectly reduce the effects of lighting on special status or listed wildlife and bird foraging, reproduction, and communication. Impacts on special status or listed species from artificial lighting would be reduced, compared with the BIA No Action Alternative.

BIA Alternative C

Under BLM Alternative C, special status or listed species would be managed to give priority to Tribal and local perspective of the landscape and traditional lifeways. It would prioritize management with the fewest impacts on human communities from oil and gas development, such as increased traffic and crime or decreased human health, air, and water quality.

BIA management affecting surface disturbance, and the impacts of that management on special status or listed species and Navajo Nation RCP wildlife areas, would be the same as those under BIA Alternative B.

Under BIA Alternative C, artificial lighting would not be managed specifically to limit impacts on wildlife; however, controlling light and lighting to protect sensitive receptors would indirectly reduce the effects of lighting on special status or listed wildlife and bird foraging, reproduction, and communication. Impacts on

special status or listed species from artificial lighting would be reduced, compared with the BIA No Action Alternative.

BIA Alternative D

Under BLM Alternative D, special status or listed species would be managed to give priority to development of fluid mineral resources; management would accommodate resource use to the greatest extent possible.

Requiring interim reclamation could contribute to localized reduced surface disturbance under this alternative, compared with the BIA No Action Alternative. This would reduce special status or listed species habitat modification, degradation, fragmentation, and removal, as well as impacts on Navajo Nation RCP wildlife areas.

Under BIA Alternative D, artificial lighting would not be managed specifically to limit impacts on special status or listed species; however, controlling light and lighting in general would indirectly reduce the effects of lighting on special status or listed wildlife and bird foraging, reproduction, and communication behaviors. Under BIA Alternative D, impacts on special status or listed species from artificial lighting would be reduced, compared with the BIA No Action Alternative.

Cumulative Impacts

The analysis area used to analyze cumulative impacts on special status or listed species is the planning area and areas within about 50 miles. This includes parts of the BLM San Luis, Albuquerque, Tres Rios, and Hassayampa Field Offices, Navajo Nation and other Tribal reservations, and other public and private lands. The larger analysis area is necessary because special status or listed species move across this larger landscape, rare plant populations could extend beyond the planning area boundary, and animals and plants depend on ecosystems that extend over larger areas.

For special status or listed species, the incremental contribution to cumulative effects from each alternative are similar to those for wildlife resources (**Section 3.4.7**) and vegetation (**Section 3.4.5**). Federal and state agency actions would generally consider and mitigate impacts on special status or listed species, and cumulative impacts would be minimized. Actions on private lands may not receive such analysis and are more likely to contribute to cumulative impacts.

Cumulative impacts under the BLM and BIA No Action Alternatives would decrease the acreage or quality of potential or suitable habitat for special status or listed plant species. Likewise, raptors and other special status or listed species would experience a decrease in available or potential habitat.

Relative to the BLM and BIA No Action Alternatives, the contribution of management to cumulative impacts under BLM and BIA Alternative A would be lower. This would be due to an emphasis on enhancing ecological systems and maintaining or improving the resiliency of ecosystems. Cumulative impacts under BLM Alternative A would result in an increase in acres of special status or listed species habitat under BLM fluid mineral lease stipulations, such as NSOs, CSUs, and TLs. BLM and BIA Alternative A would contribute the least to cumulative impacts on special status or listed species.

Relative to the BLM and BIA No Action Alternatives, the contribution of management to cumulative impacts under BLM and BIA Alternative B would be lower. This would be due to an emphasis on enhancing the unique landscapes, while sustaining and increasing native vegetation communities and preserving and protecting cultural resources. Due to lease closures and stipulations, BLM Alternative B would contribute less to cumulative impacts on special status or listed species, compared with the BLM and BIA No Action Alternatives.

Relative to the BLM and BIA No Action Alternatives, the contribution of management to cumulative impacts under BLM and BIA Alternative C would be approximately the same. This would be due to similar leasing constraints.

Relative to the BLM and BIA No Action Alternatives, the contribution of management to cumulative impacts under BLM and BIA Alternative D would be higher. This would be due to an emphasis on maximizing resources that target economic outcomes. Due to an increased amount of special status or listed species habitat disturbed, BLM and BIA Alternative D would result in a greater contribution to cumulative impacts on special status or listed species, compared with the BLM and BIA No Action Alternatives.

3.4.9 Cultural Resources

Affected Environment

Cultural resources broadly refers to the physical remains left behind by prehistoric and historic peoples, as well as places important to Tribes or other groups; however, the term is not defined in NEPA, the NHPA, or any other federal law. NEPA requires that agencies consider the impacts of their actions on aspects of the “human environment”; the NHPA (54 USC 306108) and its enabling legislation (36 CFR 800) require agencies to consider the impacts of an undertaking on historic properties. Other legislation uses different terms.

The BLM has its own definition of cultural resources; the term refers to a definite location of human activity, occupation or use identifiable through field inventory, historical documentation, or oral evidence and includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups (BLM Manual 8100). Some Tribes have more expansive definitions of cultural resources, which can include wildlife, water features, geologic features, and others. For the purposes of this document, the most common terms used are cultural resources, which is the broadest and most encompassing, and historic properties and CIMPPs. These are fully defined in the Affected Environment Supplemental Report, Section AE.2.9, Cultural Resources; they are summarized below.

A historic property is defined in the NHPA as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the [NRHP].” The term is used when discussing adverse impacts. The NRHP also notes that historic properties are “significant in American history, architecture, archaeology, engineering, and culture.”

CIMPPs are defined for the FMG RMPA/EIS to include a variety of resource types, such as TCPs, sacred sites, ceremonial grounds, and areas of traditional cultural practice. These CIMPPs are generally significant because of their importance to living communities, such as Tribes or other groups. They are discussed in greater detail in the glossary (**Appendix M**) and in **Section 3.7.1**, Native American Interests and Uses. Some of the CIMPPs are relevant to both the BLM and BIA on the lands they manage, while other CIMPP definitions are specifically related to BIA-managed Tribal trust lands and relevant Navajo Nation regulations.

In addition to the NHPA, there are other federal and Tribal regulations for protecting cultural resources that may not meet the definition of a historic property, as described in the Affected Environment Supplemental Report, Section AE.2.9, Cultural Resources, and in Section AE.5.1, Native American Interests and Uses. This includes the Archaeological Resources Protection Act (ARPA), the American Indian Religious Freedom Act (AIRFA), EO 13007, and Tribal regulations, such as the Navajo Nation Cultural Resources Protection Act (NNCRPA) and the Navajo Nation’s Policy to Protect Traditional Cultural Properties.

The BLM, BIA, and other federal agencies generally use the definitions for historic properties and NRHP eligibility as noted above (36 CFR 60 and 800) when considering cultural resources on the lands that they manage. While the BIA is the lead federal agency on most undertakings on Tribal trust lands in the BIA decision areas, these lands are in the Navajo Nation, and the BIA also contracts with the Navajo Nation Heritage and Historic Preservation Department (NNHHPD) for reviewing undertakings related to cultural resources and as part of an overall commitment to facilitating Tribal self-determination. The Navajo Nation THPO follows the relevant federal and Tribal regulations and makes recommendations on undertakings and

potential adverse effects under the Section 106 process. The BIA then considers these in making its final determinations for compliance with federal and Tribal historic preservation laws.

The BLM and BIA follow the guidance of the NHPA and evaluate cultural resources using the NRHP eligibility criteria (36 CFR 60; NPS 2002), while complying with the other relevant authorities. The agencies must consider the impacts of their actions, in accordance with the criteria of adverse effects (36 CFR 800.5(a)(1)). The Section 106 process for the FMG RMPA/EIS is ongoing concurrent with the NEPA process.

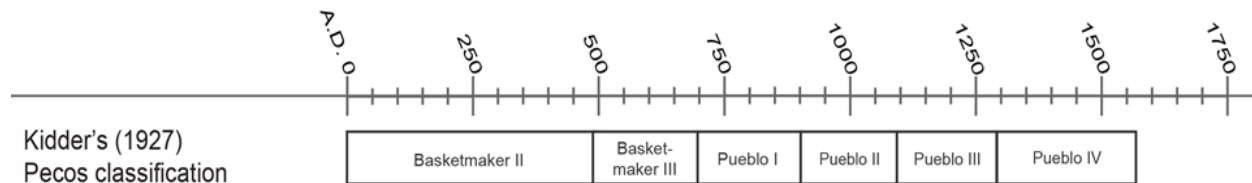
Current Conditions

This section describes the condition of historic properties and CIMPPs in the planning area that may be affected by potential leasing and other management actions. The understanding of these historic properties and CIMPPs serves as the baseline for analysis, including determining the impacts of the various alternatives on resources. The cultural history of the Southwest, including the planning area in northwest New Mexico, is described in detail in the Affected Environment Supplemental Report, Section AE.2.9, Cultural Resources, and is summarized below.

Researchers have identified thousands of important cultural resources in the planning area. Prehistoric occupation in the San Juan Basin may date to more than 12,000 years ago, although evidence of the early Paleoindian occupations is limited in comparison to the Archaic Period (5500 BC–AD 1), which is better represented in northwest New Mexico and the planning area (Fuller 2017).

As the Archaic transitioned to Basketmaker and Anasazi periods (see **Figure 3-16**, Pecos Classification for the Prehistoric Anasazi Periods), site architecture began to consist of shallow pit structures alongside circular surface structures, with limited amounts of plain pottery during the Basketmaker II period. The Pueblo I

Figure 3-16
Pecos Classification for the Prehistoric Anasazi Periods



period saw increasing reliance on maize agriculture and greater frequency of unit pueblos with contiguous surface rooms backing up to large, deep pit structures. This trend of more complex surface structures continued into the Pueblo II period and perhaps reached its height in the Pueblo III period, with the large public architecture of Chaco Canyon (see **Appendix A, Figure 3-17**, NPS, UNESCO, and Select Chacoan Roads and Great Houses). These trends occurred mostly in the Chaco Canyon and Mesa Verde region, while some populations maintained late Basketmaker and early Pueblo I settlement patterns and social organization well into the Pueblo II and Pueblo III periods—particularly those populations living in the upland mesa and canyon settings in the eastern portions of the FFO.

Examples of this are the Chaco great houses, great kivas, road complexes, and trade networks. While just outside the BIA and BLM decision areas, CCNHP hosts one of the most exceptional concentrations of archaeological sites in the American Southwest from the tenth to twelfth centuries AD. It is one of the most important pre-Columbian cultural and historical areas in the United States. The sites are considered sacred ancestral homelands by the Navajo and Pueblo people, whose oral accounts speak of their historical connections to Chaco and their spiritual relationship to the land. By the latter part of the Pueblo III Period, much of the population of the Chaco area had moved elsewhere, most likely due to a prolonged drought.

There are also many prehistoric, protohistoric, and historic sites associated with the Navajo in the planning area. The earliest Navajo sites are in the upper San Juan region, in an area known as Dinetah, where forked-stick hogans⁵ (often with interior milling bins) and Dinetah gray pottery were common. Gobernador phase sites (ca. AD 1630–1760) include Gobernador polychrome pottery and defensive masonry or rock shelter structures, known as pueblitos.

Eventually, the Dinetah area was significantly depopulated due to conflict with Utes and the Spanish, and the Navajo population moved south and west during the Cabezon phase. This move culminated with the US Army occupation of the region in 1863 and the Long Walk, where the military forced most Navajo to move to the internment camp at Bosque Redondo near Fort Sumner. In 1868, after the failure of the Bosque Redondo, the Navajo reoccupied their former territory in the south and west portions of the planning area.

Other sites important to the Jicarilla Apache Nation, the Navajo Nation, and other Tribes are habitations, hunting blinds, camps, homesteads, sweat lodges, hogans, and areas of intensive settlement and resource acquisition. Early Hispanic and Euro-American ranching, homesteading, mining, transportation, and trade are also represented in the documented archaeological and historic records of the planning area.

Many Tribes have deep historical connections to sites and CIMPPs in the planning area; some of this information may be known only by these Tribes. Often these strong relationships continue to the present day, with Tribal members continuing to visit cultural resources in the planning area for activities ranging from use of CIMPPs for ceremonial or sacred purposes to gathering plants for medicinal or other purposes. Traditional ceremonies, offerings, or pilgrimages at these CIMPPs occur throughout the planning area and do not always occur on fixed dates or times.

The CCNHP and several Chacoan outliers (see **Appendix A, Figure 3-17**) are near the south edge of the planning area, some of which are managed as ACECs by the BLM, are managed as Chaco Culture Archaeological Protection Sites, or are UNESCO World Heritage inscribed properties. The Chaco Culture Archaeological Protection Sites are a subset of known Chacoan outliers afforded special protections due to their outstanding significance or state of preservation. Congress last modified the list of Protection Sites established by PL 96-550, the 1980 organic act for CCNHP, with PL 104-111, the 1995 Chacoan Outliers Protection Act. This list is wholly inclusive of UNESCO Chaco Culture World Heritage Sites not managed as units of CCNHP or Aztec Ruins National Monument. PL 96-550 excludes most land uses from the surface estate of Chaco Culture Archaeological Protection Sites, but explicitly does not forbid mineral entry from outside the physical site boundaries. Chaco Culture Archaeological Protection Sites and their immediate environs on lands managed by the FFO are closed to mineral entry under the 2003 RMP by means of ACEC designations, but nothing in current legislation or the RMP precludes oil and gas development adjacent to these ACECs. The BLM manages a variety of ACECs related to cultural resources in the planning area, as described in greater detail in the Affected Environment Supplemental Report, Section AE.2.9, Cultural Resources.

While there is considerable similarity in the cultural resources on the lands managed by the BLM and BIA in the planning area, there are differences in the methods used to track the related data; therefore, the information presented below is based on the relevant land managing agency.

Previous Research and Resources on Lands Managed by the BLM FFO

As of November 2016, more than 23,000 archaeological inventories had been conducted in the planning area,⁶ totaling over 600,000 acres and about 15 percent of the planning area. During these inventories, over 32,000 cultural resources were documented (see Affected Environment Supplemental Report, Section AE.2.9, Cultural Resources). An annual average of almost 800 archaeological sites are recorded or updated and assessed for NRHP eligibility. Most of this work is due to oil and gas exploration and production. Of

⁵ Traditional Navajo structures, often made of logs reinforced with mud.

⁶ The data used for the EIS come from NMCRIS.

these sites, approximately 53 percent have an unknown determination of eligibility, 39 percent have been determined eligible under Criterion D for listing on the NRHP, and 8 percent have been determined not eligible.

Previous Research and Resources on Lands Managed by the BIA or Navajo Nation

The exact number of archaeological inventories conducted on the Navajo Nation in the planning area is unknown. Oil and gas or other development is less common on the Navajo Nation than on BLM-managed lands, about 15 percent of which has been surveyed; therefore, it is likely that less than 15 percent of BIA-managed lands in the planning area have been surveyed (see Affected Environment Supplemental Report, Section AE.2.9, Cultural Resources).

Based on the NNHHPD data, there are 5,383 known sites and 82 known CIMPPs on the BIA-managed lands in the Navajo Nation within the planning area. Because the NNHHPD does not maintain a comprehensive database that allows for summary site information, the following is a synthesis of the typical sites that are found on the Navajo Nation, based on a recent large-scale survey (Gilpin and Thompson 2013). These findings indicate that the temporal components are roughly 45 percent prehistoric, 26 percent historic, and 11 percent multicomponent; 18 percent have no defined temporal component. The cultural/temporal affiliations are mostly prehistoric or protohistoric, with less than 1 percent Paleo-Indian, 4 percent Archaic, 49 percent Formative, 33 percent Navajo, 2 percent Euro-American, and 12 percent undefined.

Trends

Based on the broad spectrum of conditions in the planning area, there are several trends to note. The rate of discoveries of cultural resources has steadily increased due to more oil and gas development and other undertakings. As these activities have expanded in geographical scale and scope, many more resources are discovered, and previously recorded sites and other resources are rerecorded or updated.

Changes in resource conditions can be tracked during these opportunities for rerecording or updating information; however, recording quality varies, and no agency has done a thorough analysis of the actual rate of change. But just as evaluating the trends in resource conditions is difficult to determine from permitted activities, the trends related to unpermitted activities on historic properties are even more difficult to determine.

Environmental Consequences

BLM Consideration of Management Actions on Federal Minerals Surrounding CCNHP and Chacoan Roads and Outliers

As part of the BLM alternatives and sub-alternatives, the agency is considering a range of measures applicable to the area surrounding CCNHP and Chacoan roads and outliers, which were a topic of considerable interest in scoping. Some of these measures include zones surrounding the CCNHP, roads, and outliers, where leasing would be prohibited or where NSO or CSU stipulations would be applied.

Restriction zones on federal mineral estate surrounding the CCNHP are meant to protect these resources from visual or auditory impacts of fluid mineral development, adding to protections against direct physical impacts afforded by the Chaco Culture Archaeological Protection Sites Act (PL96-550 and PL104-11).

The BLM Manual 8400 on Visual Resource Management defines the foreground-middle ground distance zones as “the area visible from a travel route, use area, or other observation point to a distance of 3 to 5 miles” and the background distance zone as “the visible area of a landscape...usually from a minimum of 3 to 5 miles to a maximum of about 15 miles from a travel route, use area, or other observer point” (BLM 1984). Varying sizes of zones are considered around CCNHP and Chacoan roads and outliers to align with the foreground-middle ground distance zones and/or the background distance zone viewshed around CCNHP. See **Appendix H** for further discussion of the rationale behind the different-sized zones around CCNHP.

The NPS estimates that lighting from drilling rigs without shielding in the area around CCNHP can be seen from 8 miles away and is equivalent to the brightness of Venus. Mitigation, such as light shielding, down lighting, and screening, can reduce this distance to 5 miles. Flaring methane from wells has an especially noticeable impact on the viewshed at night, both in terms of individual bright spots on the landscape and contribution to overall night sky glow. The NPS takes into consideration measures to restrict or prohibit new leasing and development in these areas. This is meant to reduce visual impacts from oil and gas facilities on the cultural setting and recreation experience for visitors to CCNHP and Chacoan roads and outliers.

The NPS used previous modeling to estimate that ambient sound levels across the CCNHP landscape vary from 24.4 to 35.3 dBA. Based on information from the International Organization for Standardization and the Federal Energy Regulatory Commission, as well as local mean atmospheric conditions, the NPS estimates that noise from oil and gas construction and drilling will attenuate to 35.3 dBA (the maximum ambient sound level across the CCNHP landscape) at 0.7 miles from the well location. Similarly, this noise is estimated to attenuate to 24 dBA (the minimum ambient sound level) at 1.75 miles from the well location.

Varying sizes of zones are considered around CCNHP and Chacoan roads and outliers to encompass the distance needed to reduce noise from oil and gas activities to not exceed background noise levels.

During scoping, there were diverse comments received from Tribal communities and individuals on the potential impacts from oil and gas development and hydraulic fracturing. Some Tribal members, including individuals from the Navajo Nation, felt that oil and gas infrastructure growth was affecting cultural and natural resources, along with Tribal lifeways. They indicated that agencies lack the ability to identify traditional resources or other sacred sites, to which Tribes have long-standing affiliations; they stated that, as a result, the ongoing fluid mineral development was destroying part of these Tribes' cultural landscapes.

Tribal members also expressed their concerns about the broad effects from oil and gas development that alter the landscape; individuals stated that they are no longer able to complete early morning prayers, night observances, or other ceremonies due to the impaired visual and auditory setting. They asserted that measures restricting or prohibiting new leasing and development in these areas to reduce these impacts must be considered.

The zone distances and subsequent stipulations considered in the BLM range of alternatives may change between the draft and final EIS, based on the results of the environmental consequences analysis and public input.

As an additional note, while the Section 106 process of the NHPA uses the term adverse effects, this document uses the term impacts to be consistent with NEPA guidance. Further, some of the cultural resources described herein may not qualify as historic properties under the NRHP—for example certain sacred sites under AIRFA or recent TCPs under Navajo Nation regulations—and therefore not using the term adverse effects is intended to include impacts on all these important cultural resources, not just those that are eligible to the NRHP. Further, the ACHP Office of General Counsel issued a memorandum on June 7, 2019, related to a recent court decision regarding the meaning of “direct” in Section 106 and the NHPA. The ACHP noted that “if the effect comes from the undertaking at the same time and place with no intervening cause, it is considered ‘direct’ regardless of its specific type (e.g., whether it is visual, physical, auditory, etc.). ‘Indirect’ effects are those caused by the undertaking that are later in time or farther removed in distance but are still reasonably foreseeable” (ACHP 2019). To avoid confusion when discussing impacts on cultural resources, the types of impacts are therefore specified below, such physical, visual, auditory, and vibratory.

BLM Alternatives

Impacts Common to All BLM Alternatives

Under all BLM alternatives, fluid mineral leasing, exploration, and development would continue. As described in greater detail in the Environmental Consequences Supplemental Report, Section EC.2.9, Cultural

Resources, there is the potential for direct and indirect impacts on cultural resources with each phase of fluid mineral development from planning, leasing, and an APD, which are considered separate undertakings. The Advisory Council on Historic Preservation (ACHP) has acknowledged that the early phases of fluid mineral development such as leasing (or planning) have the potential to affect historic properties (ACHP 2016, 2017, 2018). The ACHP has also acknowledged that a phased approach to Section 106 of the NHPA is reasonable and in good faith, provided the agencies complete all appropriate Section 106 efforts (identifying historic properties, assessing effects, and consulting with agencies, Tribes, and other parties) for each phase, which are considered separate undertakings.

The agencies' understanding of how historic properties and CIMPPs could be impacted by fluid mineral development increases in specificity at each stage and separate undertaking (planning—leasing—APD) through the relevant Section 106 and NEPA processes and consultation with Tribes as more detail is known about the locations of proposed development.

Under all BLM alternatives, there are also designated ACECs that were designated as part of the 2003 RMP planning process. These are managed to limit impacts on various resources, including cultural resources, from such uses as fluid mineral development (BLM 2003). See **Appendix K** for more information on ACECs in the planning area.

Light pollution from oil and gas development could cause visual impacts on CIMPPs (including the Navajo concept of *Yádiłhíí*—a Navajo term for the universe, cosmos, or outer space, which is described in greater detail in **Section 3.4.11**, Visual Resources) under all alternatives. However, the BLM could mitigate these impacts by applying COAs for dark skies at the site-specific APD phase (see **Appendix C**). Additionally, under all BLM alternatives, fluid mineral leasing and subsurface development in areas of NSO or CSU stipulations could result in visual, auditory, or other impacts on CIMPPs and diminish the ability of Tribes to conduct ceremonies or otherwise use these cultural resources, which could affect the mental well-being of certain Tribal members, as described by Begay (2001).

BLM No Action Alternative

Lands and Realty and Fluid Minerals

Under the BLM No Action Alternative, fluid mineral leasing would be allowed on roughly 95 percent of the BLM mineral decision area, and there would be no ROW exclusions or avoidance in the BLM surface decision area. Instead, ROW authorizations would continue to be managed on a case-by-case basis. The BLM could use its discretion to locate ROWs to avoid cultural resources but would not be committed to doing so. As detailed in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), the BLM No Action Alternative would allow 737,700 acres to be open to leasing with standard terms and conditions, 83,800 acres would be managed with NSO stipulations, 1,112,600 acres would be managed with CSU stipulations, and 316,300 acres would be managed with TL stipulations. The areas with the greatest potential for impacts on cultural resources from fluid mineral development are those managed with standard lease terms and conditions, with decreasing potential for impacts in areas managed with NSO, CSU, and TL stipulations.

Where surface occupancy for fluid mineral leasing and development is allowed under the BLM No Action Alternative, there is the potential for physical impacts that diminish the historic and physical integrity of properties and CIMPPs. Areas allowing surface occupancy also create the potential for visual or auditory impacts on the qualities that make historic properties and CIMPPs significant to Tribes or eligible for listing on the NRHP. There would be fewer physical, visual, or auditory impacts on historic properties and CIMPPs in CSU areas (depending on the type or extent of restriction on the surface use).

Impacts Common to All BLM Action Alternatives

Vegetation Management

Under all BLM action alternatives, stipulations related to vegetation would allow for gathering and cutting woody species in a riparian area when an exception is granted for traditional uses such as ceremonial

gathering of sacred plants at a CIMPP. The BLM would restrict vegetation treatments in areas of known identified sacred or medicinal plant gathering CIMPPs, with exceptions that may be granted for traditional plant gathering areas that have invasive plants. Further, as part of the Section 106 process of the NHPA, the BLM would consult with Tribes with cultural affinity for CIMPPs so as to avoid or minimize impacts on these types of resources, such as traditional plant gathering and offering areas or sacred viewsheds. The BLM also would consult with Tribes and the public, as appropriate, before any vegetation treatments would occur on or near CIMPPs.

Land Exchange

In addition, the BLM would consider allowing the exchange of unleased lands with the National Park Service (NPS) within 1 mile of the CCNHP (approximately 3,400 acres) in consideration of avoiding or minimizing impacts on Chacoan sites, as described in Public Law 96-550. These management actions would result in fewer impacts on historic properties and CIMPPs, when compared with the BLM No Action Alternative.

BLM Alternative A

Vegetation Management and Lands with Wilderness Characteristics

Under BLM Alternative A, mechanical or surface disturbing vegetation treatments would not be allowed within 24,300 acres of lands managed to protect with wilderness characteristics as a priority over other multiple uses; hereby providing indirect protection and decreasing the potential for physical impacts on historic properties and CIMPPs located within the proposed boundaries of designated Units 069, 075, and 082, when compared with the BLM No Action Alternative.

Lands and Realty

Under its Alternative A, the BLM would manage a 4-mile zone around the CCNHP to exclude oil and gas ROWs, except within designated utility corridors. Additional oil and gas ROW exclusions would include the areas within 3 miles of Chacoan outliers and roads, including those in and outside of ACECs, or areas within 0.25 miles of any structures. Examples are houses, barns, structures on home site leases, or other community, municipal, and public buildings, some of which may be historic properties.

Management under BLM Alternative A would include avoidance for ROWs within 0.7 miles of CIMPPs. Such management would also apply to historic properties, where setting or feeling are important aspects of their NRHP eligibility and integrity. Further, the BLM would avoid placing new utility corridors within 3 miles of Chacoan roads or great houses and crossing or paralleling known Chacoan roads, including those in and outside ACECs.

As compared with the BLM No Action Alternative, which lacks comparable management, the lands and realty management under BLM Alternative A would result in less potential for physical impacts on historic properties and CIMPPs, and they would reduce visual, auditory, and vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling. The BLM could further reduce impacts by using its discretion to locate ROWs to avoid these resources.

Fluid Minerals

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), the areas closed to leasing by BLM in their mineral decision area under Alternative A would increase by 5 times when compared with the BLM No Action Alternative. This increase in areas closed to leasing under BLM Alternative A would result in less potential for physical impacts on historic properties or CIMPPs.

Under its Alternative A, the BLM would not allow fluid mineral leasing in a 2-mile zone around the CCNHP and Chacoan outlier sites or roads, including those resources in and outside of ACECs. This would result in less potential for physical impacts on historic properties and CIMPPs or visual and auditory impacts, such as reduced integrity of setting, feeling, or association, or impacts from vibrations. For example, this closure would prevent noise from new oil and gas development from exceeding background levels in CCNHP and would eliminate most foreground-midground visual impacts from new well pads and facilities. Some

background visual impacts would also be addressed by the NSO stipulation extending out to 4 miles around the CCNHP. Additionally, lighting impacts from oil and gas development could be minimized by this management, in combination with night skies COAs.

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), when compared with the BLM No Action Alternative, under BLM Alternative A the areas open to leasing with standard terms and conditions would decrease by 67 percent, areas with NSO stipulations would increase by 12 times, and areas with CSU stipulations would decrease by 37 percent. NSO stipulations related to cultural resources under BLM Alternative A include the areas from 2 to 4 miles outside the CCNHP and from 2 to 3 miles outside of Chacoan outliers and roads, including those in and outside of ACECs. Additionally, BLM Alternative A would include NSO stipulations within 0.7 miles of CIMPPs and historic properties where setting or feeling are important aspects of their NRHP eligibility and integrity, and within 0.25 miles of such structures as houses, barns, structures on home site leases, or other community, municipal, and public buildings, some of which may be historic properties.

As compared with the BLM No Action Alternative, these fluid mineral leasing closures or stipulations under BLM Alternative A (particularly the NSO stipulations) would result in less potential for physical impacts on historic properties and CIMPPs, and they would reduce the potential visual, auditory, and vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling.

BLM Alternative B (Includes BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

Vegetation Management

The BLM would plan vegetation treatments to enhance the setting of historic properties eligible or potentially eligible for listing on the NRHP under Criteria A, B, or C. Certain game management units would also include vegetation treatments focused on managing for CIMPPs.

Further, the BLM would allow no firewood gathering or cutting near and around historic properties eligible for listing on the NRHP under Criteria A, B, or C. This would be the case in areas where the vegetation contributes to the historical integrity and eligibility of the property or where such firewood gathering or cutting could affect historic properties eligible under Criterion D. Under BLM Alternative B, these stipulations would result in less potential for impacts on historic properties and CIMPPs, when compared with the BLM No Action Alternative, which includes no similar management.

Lands with Wilderness Characteristics

Under its Alternative B, the BLM would allow no leasing on 24,300 acres of lands with wilderness characteristics. This would result in less potential for impacts on historic properties and CIMPPs in these areas, when compared with the BLM No Action Alternative.

Lands and Realty

Under its Alternative B, the BLM would manage a 10-mile zone around the CCNHP to exclude oil and gas ROWs, except in designated utility corridors. Operators developing wells within 10 miles of the CCNHP would be required to use remote telemetry for well monitoring, liquid gathering systems, and off-site facilities. Oil and gas or transmission line (greater than 115 kilovolts [kV]) ROW exclusions would include the areas within 5 miles of Chacoan outliers and roads, including Chacoan ACECs, Chaco protection sites, and World Heritage sites. For oil and gas ROWs, there would be an exclusion within 0.25 miles of such structures as houses, barns, structures on home site leases, or other community, municipal, and public buildings, some of which may be historic properties.

Management under BLM Alternative B would include ROW avoidance within 1.6 miles of CIMPPs and historic properties, where setting or feeling are important aspects of their NRHP eligibility and integrity. ROW avoidance measures would restrict construction within a 2-mile corridor around SJ 7950 during peak visitation to the CCNHP, from April to October. Further, the BLM would avoid placing utility corridors

within 5 miles of Chacoan roads or great houses or crossing or paralleling known Chacoan roads, including those in and outside ACECs.

As compared with the BLM No Action Alternative, which lacks comparable management, the lands and realty management under BLM Alternative B would result in less potential for physical impacts on historic properties and CIMPPs. They would reduce visual, auditory, and vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling. The BLM could further reduce impacts by using its discretion to locate ROWs to avoid these resources.

Fluid Minerals

BLM Sub-Alternatives B1 and B2

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), the areas closed to leasing by BLM in their mineral decision area under BLM Sub-Alternatives B1 and B2 would increase by 566 percent and 656 percent, respectively, when compared with the BLM No Action Alternative. This increase in areas closed to leasing under BLM Sub-Alternatives B1 and B2 would result in less potential for impacts on historic properties or CIMPPs.

Under its Sub-Alternative B1, the BLM would not allow fluid mineral leasing in a 10-mile zone around the CCNHP and around Chacoan outlier sites, including those resources in and outside of ACECs. Under BLM Sub-Alternative B2, the BLM would not allow fluid mineral leasing in a 15-mile zone around Chacoan outlier sites, including those resources in and outside of ACECs. These stipulations under BLM Sub-Alternatives B1 and B2 would result in less potential for physical impacts on historic properties and CIMPPs or visual, auditory, and vibratory impacts that could reduce integrity in setting or feeling. They would prevent noise from new oil and gas development from impacting these resources and would eliminate most foreground-middleground visual impacts from new well pads and facilities. It would also eliminate some background visual impacts, particularly around the CCNHP. Additionally, lighting impacts from oil and gas development would be minimized regardless of whether additional lighting mitigation measures are implemented.

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), when compared with the BLM No Action Alternative, under BLM Sub-Alternative B1 the areas open to leasing with standard terms and conditions would decrease by 74 percent, areas with NSO stipulations would increase by 602 percent, and areas with CSU stipulations would decrease by 20 percent.

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), when compared with the BLM No Action Alternative, under BLM Sub-Alternative B2 the areas open to leasing with standard terms and conditions would decrease by 75 percent, areas with NSO stipulations would increase by 554 percent, and areas with CSU stipulations would decrease by 26 percent.

Additionally, BLM Sub-Alternatives B1 and B2 would include NSO stipulations within 1.6 miles of CIMPPs and historic properties where setting or feeling are important aspects of their NRHP eligibility and integrity. Such stipulations also would apply within 0.25 miles of such structures as houses, barns, structures on home site leases, or other community, municipal, and public buildings, some of which may be historic properties. Further, there would be a TL stipulation to prohibit oil and gas activities for one mile on either side of San Juan County Road 7950 (SJ 7950)—the main entrance to the CCNHP—during peak visitation to the CCNHP, from April to October.

As compared with the BLM No Action Alternative, these fluid mineral leasing closures or stipulations under BLM Sub-Alternatives B1 and B2 would result in less potential for physical impacts on historic properties and CIMPPs; they would reduce visual, auditory, and vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling.

BLM Alternative C (Includes BLM Sub-Alternatives C1–C6; applying only to Fluid Minerals)

Vegetation Management

Under BLM Alternative C, certain game management units would include vegetation treatments focused on managing for traditional plant uses and CIMPPs. These treatments would result in less potential for impacts on historic properties and CIMPPs, when compared with the BLM No Action Alternative, which includes no similar management.

Lands with Wilderness Characteristics

Under BLM Alternative C, lands managed to protect wilderness characteristics would not be managed as a priority over other multiple uses.

Lands and Realty

Management under BLM Alternative C would include ROW avoidance within 656 feet of any structures, such as houses, barns, structures on home site leases, or other community, municipal, and public buildings, some of which may be historic properties.

As compared with the BLM No Action Alternative, which lacks comparable management, the lands and realty management under BLM Alternative C would result in less potential for physical impacts on historic properties and CIMPPs, and they would reduce visual, auditory, and vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling. The BLM could further reduce impacts by using its discretion to locate ROWs to avoid these resources.

Fluid Minerals

BLM Sub-Alternatives C1 to C6

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), BLM Alternative C includes six sub-alternatives that propose varied fluid mineral leasing management. The varied management particularly changes in the proximity of the CCNHP. For example, BLM Sub-Alternatives C1 to C5 respectively include NSO stipulations around the CCNHP from miles 0-2, miles 0-4, miles 0-6, miles 0-8, and miles 0-10, and BLM Sub-Alternative C6 proposes a fluid mineral leasing closure from miles 0-4 and NSO stipulations from miles 4-6. When compared with the BLM No Action Alternative, the areas closed to leasing by BLM in their mineral decision area under BLM Sub-Alternatives C1–C5 would remain the same, while the areas closed to leasing by the BLM under Sub-Alternative C6 would increase by 41 percent.

Areas open to leasing with mapped leasing stipulations under BLM Alternative C sub-alternatives would also change when compared with the BLM No Action Alternative. Areas open to leasing with standard terms and conditions would respectively decrease under BLM Sub-Alternatives C1–C6 by 7 percent, 10 percent, 14 percent, 19 percent, 24 percent, and 14 percent. Areas open to leasing with NSO stipulations would respectively increase under BLM Sub-Alternatives C1–C6 by 60 percent, 93 percent, 133 percent, 188 percent, 253 percent, and 87 percent. Areas open to leasing with CSU stipulations would increase by 3 percent for all BLM Alternative C sub-alternatives, and areas open to leasing with TL stipulations would remain the same for all BLM Alternative C sub-alternatives.

NSO stipulations related to cultural resources under BLM Alternative C that are not mapped include the areas within 1 mile of Chacoan outliers, within 0.7 miles of CIMPPs and historic properties, where setting or feeling is an important aspect of their NRHP eligibility and integrity, within 0.75 miles of Chacoan roads that are not within ACECs, and within 0.5 miles of Chacoan road ACECs. This includes the North Road and Ah-shi-sle-pah Road ACECs. Additionally, BLM Alternative C would include NSO stipulations within 0.7 miles of such structures as houses, barns, structures on home site leases, or other community, municipal, and public buildings, some of which may be historic properties.

Compared with the BLM No Action Alternative, these fluid mineral leasing closures or stipulations under BLM Alternative C, including all sub-alternatives, would result in less potential for physical impacts on historic properties and CIMPPs. They would reduce visual, auditory, and vibratory impacts that could diminish

aspects of historical integrity, such as setting or feeling. The closures or stipulations around the CCNHP would prevent noise from new oil and gas development from exceeding background levels in the CCNHP and would eliminate visual impacts from new well pads and facilities in the highest-priority foreground around the park. Additionally, lighting impacts from oil and gas development would be reduced, particularly if additional night skies COAs are implemented at the APD phase.

Per **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), there would be reductions in impacts around the CCNHP from the BLM Alternative C fluid mineral leasing stipulations (including all sub-alternatives) when compared with the BLM No Action Alternative. For example, when compared with the BLM No Action Alternative, all the BLM Alternative C sub-alternatives propose reductions in areas open to fluid mineral leasing subject to standard terms and conditions, ranging from BLM Sub-Alternative C1 (7.1 percent) to BLM Sub-Alternative C5 (24.3 percent). Similarly, areas with NSO stipulations for fluid mineral leasing increase under all BLM Alternative C sub-alternatives when compared with the BLM No Action Alternative, ranging from BLM Sub-Alternative C1 (60 percent) to BLM Sub-Alternative C5 (253 percent). As described above in *Impacts Common to All the BLM Alternatives*, fluid mineral leasing and subsurface development in areas of NSO or CSU stipulations could result in visual, auditory, or other impacts on CIMPPs and diminish the ability of Tribes to conduct ceremonies or otherwise use these cultural resources, which could affect the mental well-being of certain Tribal members, as described by Begay (2001).

BLM Alternative D

Vegetation Management

No impacts on cultural resources by vegetation treatments are anticipated.

Lands with Wilderness Characteristics

Under BLM Alternative C, lands managed to protect wilderness characteristics would not be managed as a priority over other multiple uses.

Lands and Realty

As compared with the BLM No Action Alternative, the ROW management under BLM Alternative D would result in similar, or less, potential for physical impacts on historic properties and CIMPPs and visual, auditory, and vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling.

Fluid Minerals

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), the areas proposed as open or closed to leasing by BLM in their mineral decision area under Alternative D are the same as under the BLM No Action Alternative. Under its Alternative D, the BLM would not apply stipulations to fluid mineral leasing near CIMPPs and historic properties. The potential for physical impacts on historic properties and CIMPPs or visual, auditory, and vibratory impacts that could reduce integrity in setting and feeling, under BLM Alternative D would, therefore, be similar to that under the BLM No Action Alternative.

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), when compared with the BLM No Action Alternative, under BLM Alternative D the areas open to leasing with standard terms and conditions would increase by 4 percent, areas with NSO stipulations would decrease by 51 percent, and areas with CSU stipulations would decrease by 3 percent. NSO stipulations related to cultural resources under BLM Alternative D would include the areas 656 feet (200 meters) from such structures as houses and barns, structures on home site leases, and 1,000 feet from other community, municipal, and public buildings, some of which may be historic properties. As compared with the BLM No Action Alternative, these fluid mineral leasing stipulations under BLM Alternative D would result in similar, or less, potential for physical impacts on historic properties and CIMPPs. However, they would result in visual, auditory, and vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling.

BIA Alternatives

Impacts Common to All BIA Alternatives

As described above in *Impacts Common to All BLM Alternatives* and in greater detail in Environmental Consequences Supplemental Report, Section EC.2.9, Cultural Resources, there is the potential for direct and indirect impacts on cultural resources with each phase of fluid mineral development from planning, leasing, and an APD. Under all BIA alternatives, the BIA would also continue its mandate to protect and improve the Navajo Tribal trust and individual Indian allotment lands, including the potential leasing of fluid minerals on lands such as those individual Indian allotments within or near the boundaries of the CCNHP. Fluid mineral leasing in the areas near the CCNHP would limit infringement of Navajo Nation Tribal sovereignty and self-determination for allottees to develop their lands in the manner they deem appropriate. Fluid mineral leasing in these areas under all alternatives has the potential for physical or visual, auditory, and vibratory impacts on the historic properties and CIMPPs in or near the CCNHP. Examples are the diminishment of physical integrity or historical integrity, such as setting, feeling, or association, or significance to a Tribe, or a reduction in the ability of Tribes to conduct ceremonies or otherwise use CIMPPs, which could impact the mental well-being of certain Tribal members as described by Begay (2001). The Navajo Nation THPO would consult with local communities and other Tribes under all alternatives.

Under all BIA alternatives, additional surface disturbance from oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative. Otherwise, the type of impacts common under all BIA alternatives would be the same as those described under the *Impacts Common to All BLM Alternatives*.

BIA No Action Alternative

Fluid mineral leasing and exploration would be allowed on all 593,460 acres of the BIA mineral decision area: 383,200 acres and 210,260 acres, respectively, of Navajo Tribal trust and individual Indian allotment minerals. Surface occupancy for fluid mineral leasing and exploration would be allowed on most of the 885,460 acres of the BIA surface decision area: 657,360 acres and 210,106 acres, respectively, of Navajo Tribal trust and individual Indian allotment minerals. The BIA surface decision area open to surface occupancy for fluid mineral leasing and exploration would include the 828,600 acres (94 percent) of low sensitivity, moderate sensitivity, and community development areas identified in the Navajo Nation Department of Fish and Wildlife (NNDFW) Biological Resource Land Use Clearance Policies and Procedures (RCP); however, in general, this would not include the 50,400 acres (6 percent) of high sensitivity, biological preserves, and recreation areas described in the RCP.

Surface occupancy for fluid mineral leasing and development is the least restricted in the RCP's low sensitivity, moderate sensitivity, and community development areas; therefore, it has the greatest potential for direct impacts on cultural resources under the BIA No Action Alternative. In contrast, the RCP's high sensitivity, biological preserves, and recreation areas have the most potential restrictions on surface occupancy for fluid mineral leasing and development, and therefore the potential for fewer physical impacts under the BIA No Action Alternative. These potential impacts include diminishing the historic and physical integrity of historic properties and CIMPPs.

Areas allowing surface occupancy also create the potential for visual, auditory, and vibratory impacts on the qualities that make historic properties and CIMPPs significant to Tribes or eligible for listing on the NRHP. Fluid mineral leasing and subsurface development could affect CIMPPs and diminish the ability of Tribes to conduct ceremonies or otherwise use these cultural resources, which could affect the mental well-being of certain Tribal members as described by Begay (2001).

BIA Alternative A

Under this alternative, there would be stipulations related to fluid minerals and cultural resources that continue the current management under the BIA No Action Alternative and would require lessees to comply with all applicable federal and Tribal laws and regulations; therefore, the type of impacts on cultural resources

for continuing this current management would be the same under BIA Alternative A as under the BIA No Action Alternative.

Otherwise, when compared with the BIA No Action Alternative, fluid mineral lease stipulations under BIA Alternative A reflect a tiered approach to the Section 106 process (as discussed above in *Impacts Common to All BLM Alternatives* regarding recent ACHP opinions). Here, historic properties and CIMPPs would include the area of potential effects identified at the site-specific APD level. The stipulations under this alternative would also require that the Navajo Nation and BIA consult with local Navajo communities and chapters regarding cultural resources and the proposed leases. The tiered approach to the Section 106 process under this alternative, and the consultation requirement for the Navajo Nation BIA, meet the “reasonable and good faith” identification standard discussed by the ACHP (ACHP 2018). They would reduce impacts on cultural resources, when compared with the BIA No Action Alternative.

A stipulation under this alternative would also require lessees to set back fluid mineral wells at least 0.25 miles from structures and CIMPPs on both Navajo Tribal trust and individual Indian allotment lands. This could reduce indirect impacts on the setting or feeling of historic properties and CIMPPs from fluid mineral leasing under this alternative. This is because the current lease stipulations under the BIA No Action Alternative require fluid mineral wells to be set back at least 500 feet from structures on Navajo Tribal trust land and at least 200 feet on individual Indian allotment land.

BIA Alternative B

The types of impacts would be the same as those described under BIA Alternative A. Otherwise, a stipulation under this alternative would require directional drilling for fluid minerals to limit the visibility of proposed well locations from CIMPPs or culturally sensitive viewpoints. These locations may not be on a proposed lease; they would be defined through the Section 106 process and consultation with the BIA, Navajo Nation, other Tribes with CIMPPs in the viewshed, and local chapters and communities. This would limit the potential for visual, auditory, and vibratory impacts on historic properties or CIMPPs under BIA Alternative B, when compared with the BIA No Action Alternative.

Additionally, fluid mineral leasing stipulations under this alternative would limit light pollution at key cultural resources identified by the NPS, Navajo Nation, or other Tribes. The stipulations would also keep nighttime noise levels to 35 dBA at the CCNHP and Chacoan outlier sites. These stipulations would limit the potential for visual and auditory impacts on historic properties or CIMPPs, when compared with the BIA No Action Alternative.

BIA Alternative C

The type of impacts would be the same as those impacts described under BIA Alternative B. Otherwise, fluid mineral leasing stipulations under this alternative would limit the potential for visual, auditory, and vibratory impacts on historic properties or CIMPPs, when compared with the BIA No Action Alternative. Such stipulations would limit impacts from light pollution at CIMPPs (including the Navajo concept of Yádiłhił) or locations and structures significant to local residents, and keep nighttime noise levels to 35 dBA at CIMPPs or locations and structures significant to residents.

BIA Alternative D

There would be leasing stipulations related to fluid minerals and cultural resources that continue the current management under the BIA No Action Alternative. They would require lessees to comply with all applicable federal and Tribal laws and regulations. Stipulations under BIA Alternative D would continue the current lease stipulations under the BIA No Action Alternative. They require fluid mineral wells to be set back at least 500 feet from structures on Navajo Tribal trust land and at least 200 feet on individual Indian allotment land; therefore, the type of impacts on cultural resources for continuing this current management would be the same under BIA Alternative D as under the BIA No Action Alternative.

Stipulations under this alternative that relate to the tiered approach to Section 106 described by the ACHP (ACHP 2018) are the same as those described under BIA Alternatives A, B, and C; therefore, the impacts would be the same. The tiered approach to the Section 106 process under this alternative, and the consultation requirement for the Navajo Nation THPO, meet the “reasonable and good faith” identification standard and would reduce impacts on cultural resources, when compared with the BIA No Action Alternative.

In addition, a stipulation under this alternative to limit light pollution from fluid mineral development and operations, such as flaring, would limit the potential for visual impacts on historic properties or CIMPPs under BIA Alternative D, when compared with the BIA No Action Alternative.

Cumulative Impacts

The cumulative impacts analysis area for cultural resources includes the entire planning area, regardless of surface or mineral ownership. Past and present actions with direct and indirect impacts, such as reducing a property’s historical integrity or reducing the ability of a Tribe to use a CIMPP, on historic properties and CIMPPs are those from mineral and infrastructure development, agriculture and grazing, residential and commercial development, travel off designated routes, wildfire, and recreation. Reasonably foreseeable future actions with the potential to affect historic properties and CIMPPs are similar to the past and present actions.

Management under the BLM and BIA alternatives would contribute to cumulative impacts on historic properties and CIMPPs in the planning area. Oil and gas exploration and leasing or ROW authorization in the BLM and BIA decision areas could result in physical or visual, auditory, and vibratory impacts on historic properties’ physical integrity, setting, or feeling from increased traffic, dust, noise, and light pollution.

Proposed management under BLM Alternatives A and B would be the most restrictive toward oil and gas development, which would reduce the contribution to cumulative impacts on historic properties and CIMPPs in the planning area (see **Table 3-1**, RFD Projections by Alternative). The potential contribution to cumulative impacts on historic properties and CIMPPs would be increased under BLM Alternative C; however, the highest potential contributions to impacts on historic properties and CIMPPs would occur under the BLM No Action Alternative and Alternative D. This is because of the greater amount of surface disturbance projected under these alternatives (see **Table 3-1**, RFD Projections by Alternative).

Proposed management under BIA Alternatives A and B would be the most restrictive toward oil and gas development, which would reduce the contribution to cumulative impacts on certain historic properties, CIMPPs, and uses in the planning area. Management under BIA Alternative C would contribute similarly to cumulative impacts on historic properties as BIA Alternatives A and B; BIA Alternative C would have the least potential contribution to cumulative impacts on CIMPPs. The highest potential contributions to impacts would be under the BIA No Action Alternative and Alternative D, because of the greater amount of surface disturbance projected under these alternatives.

3.4.10 Paleontological Resources

Affected Environment

Current Conditions

Paleontological resources consist of any fossilized remains, traces, or imprints of organisms, preserved in the earth’s crust, that are of paleontological interest and that provide information about the history of life on earth (PRPA Section 6301; 16 USC 470aaa-1). These paleontological resources may also be CIMPPs, which are discussed in greater detail in **Section 3.7.1**, Native American Interests and Uses. In the decision area, Potential Fossil Yield Classification (PFYC) Class 2 (low potential) makes up approximately 22,000 acres and Class 3 (moderate potential) geologic formations account for approximately 389,300 acres on federal mineral estate (see **Figure 3-18**, Potential Fossil Yield Classification). PFYC Class 4 (high potential)

formations are found on only 7,400 acres of the decision area. There are 2,181,100 acres of PFYC Class 5 (very high potential) identified for the decision area (BLM GIS 2017).

Sensitive units for paleontological resources are Late Cretaceous and Early Paleocene formations in the planning area, which also contain the source rocks and natural reservoirs for oil and gas. Late Cretaceous rocks exposed in the San Juan Basin are the Mancos Shale, Gallup Sandstone, Mesaverde Group, Lewis Shale, Pictured Cliffs Formation, Fruitland Formation, and Kirtland Shale (see **Figure AE-6**). These units preserve two major transgressions, followed by regressions, with the Pictured Cliff Sandstone representing the final rock unit deposited in marine conditions in the San Juan Basin. Early Paleogene units are the Ojo Alamo Formation, Animas Formation, Nacimiento Formation, and San Jose Formation, deposited primarily in river environments. Abundant fossils are found in the San Juan Basin (Kues 2008; Lucas et al. 1988).

The Mancos Shale through Pictured Cliffs Formations are listed as PFYC 3. These rocks often represent marine depositional conditions, and known occurrences of vertebrate fossils are sporadic. Known fossils are those of bivalves, ammonites, trace fossils, and rare fish and marine reptiles (Sealey and Lucas 1997; Lucas et al. 1988).

The Ojo Alamo Formation is also listed as PFYC 3. It is a non-marine unit containing intermittent fossils with low predictability, primarily containing petrified wood. Of note, a hadrosaurian femur was collected from the Ojo Alamo Formation (Lucas et al. 2009). This has led to debate about the possibility of dinosaurs surviving the end-Cretaceous extinction event in the San Juan Basin (e.g., Fassett and Lucas 2000; Lucas et al. 2009).

The Fruitland Formation and Kirtland Shale are the final two rocks deposited in the San Juan Basin during the Cretaceous. Both are PFYC 5, due to high concentrations of vertebrate fossil localities known in the basin, especially in the Bisti/De-na-zin Wilderness and Ah-shi-sle-pah Wilderness Areas.

Invertebrate fossils are those of insects, gastropods, bivalves, crustaceans, and bryozoans (Wolberg et al. 1988). Vertebrate fossils are diverse in these two formations. Examples are bony fish, sharks and rays, lizards, snakes, frogs, salamanders, turtles, crocodiles, dinosaurs, and mammals. Additionally, dinosaur skin impressions, coprolites,⁷ and tracks are known from these rocks (Hall et al. 1988). Plant fossils are those of logs, stumps, leaves, and palm fronds (Hunt and Lucas 1992).

The Animas Formation is primarily Paleocene, though the bottom is Late Cretaceous. In FFO-managed lands, there are Animas Formation outcrops only along the La Plata River valley and at the base of Pinyon Mesa in the northwest part of the San Juan Basin. It grades laterally with the Nacimiento Formation (Craig 2001). While it is listed as PFYC 4, no fossil localities have been recorded from this formation in the San Juan Basin.

The early Paleogene Nacimiento and San Jose Formations are PFYC 5, due to high occurrences of vertebrate fossils, such as those of bony fish, rays, salamanders, frogs, lizards, snakes, turtles, crocodiles, champsosaurus,⁸ birds, and abundant mammals (Lucas and Williamson 1992; Williamson and Lucas 1992; Williamson 1996). Vertebrates from the Nacimiento Formation in the San Juan Basin form the basis for the Puercan and Torrejonian North American land mammal ages (Archibald et al. 1987). Invertebrate fossils include gastropods, and many stumps, logs, and leaves are found in these rock units.

Key features in the San Juan Basin are extensive badlands and abundant canyon walls and cliff faces with widespread exposures of fossil-bearing late Cretaceous and Paleogene sandstones and mudrocks. Vertebrate fossils are most commonly preserved in mudrocks and are therefore particularly sensitive, especially where exposed in badlands topography. Mudrock beds are present in all of the vertebrate fossil-bearing units in the San Juan Basin and are closely tied to PFYC 4 and 5.

⁷ Fossilized dung

⁸ Reptile similar to a crocodile

The BLM has identified several paleontological areas as being especially sensitive for paleontological resources (**Table 3-3 I**, BLM-Designated Paleontological Areas Identified for Management). The BIA or the Navajo Nation do not have any SDAs for paleontology.

**Table 3-3 I
BLM-Designated Paleontological Areas Identified for Management**

Locality Name	Size (Acres)	Environmental Education/Scientific Research	Surface Geology
Ah-shi-sle-pah	6,560	Wilderness Area	Kirtland, Fruitland Formations
Bettonie Tsosie	8,070	Fossil area	Nacimiento Formation
Bisti/De-na-zin Wilderness	39,960	Wilderness Area	Kirtland, Fruitland Formations
Bohanon Canyon Complex	12,530	Fossil area	Nacimiento Formation
Carson Fossil Pocket	960	Fossil area	Nacimiento Formation
Fossil Forest	2,800	Research Natural Area	Kirtland, Fruitland Formations
Gobernador and Cereza	17,900	Fossil area	San Jose Formation
Kutz Canyon Paleontological Area	47,700	Fossil area	Nacimiento Formation
Lybrook Fossil Area	19,850	Fossil area	Nacimiento, San Jose Formations

In the FFO, the BLM manages nine fossil areas as SDAs to protect and provide scientific study and public interpretation of animal and plant fossils, palynomorphs,⁹ petrified wood, and trace fossils in rocks spanning multiple geologic periods.

Trends

Researchers and academics visit the fossil-rich formations found in the planning area. There are permitted paleontological studies of fossils found from the Fruitland Formation and Kirtland Shale in the Ah-shi-sle-pah and Bisti/De-na-zin Wilderness Areas. Fossils in these areas and in the San Juan Basin record the end-Cretaceous extinction event.

Additionally, there has been significant recent activity toward the southern end of the San Juan Basin, related to exploration of the Mancos Shale for hydrocarbons. The Paleocene Nacimiento Formation is exposed at the surface in the areas where most of this work is occurring. The resulting paleontological surveys and monitoring have led to an increased knowledge of fossil distribution, particularly those beds in the formation that have an especially high concentration of fossils. Fossils are provided extra protection early in new project planning, as fossil-bearing beds are mapped along their trend and are avoided.

Environmental Consequences

BLM Alternatives

Impacts Common to All BLM Alternatives

Under all BLM alternatives, surface and near-surface fossil exposures can be affected by shallow ground-disturbing activities, including vegetation management; ROW development; and fluid mineral leasing, exploration, and development. There is the potential for direct impacts on paleontological resources with each phase of fluid mineral exploration and development after leasing and the APD. Surveys associated with continuing development would increase knowledge of paleontological resources in the planning area. Depending on the alternative, the 2019 RFD estimates up to 11,800 acres of new surface disturbance resulting from oil and gas development on BLM-managed federal mineral estate and 18,500 acres of the planning area, which includes both new wells and disturbance on existing wells. The No Action Alternative and Alternative D may result in the greatest levels of development (**Appendix I**). Under all alternatives, there would also be a risk of impacts on paleontological resources resulting from access or activity where

⁹ A microscopic fossil composed especially of pollen or spores.

fossils may be present, increasing the risk of vandalism, unauthorized collection, or inadvertent damage or loss.

BLM SDAs have stipulations that would restrict some surface uses on 613,000 acres of the BLM-managed surface land. These SDAs include 586,000 acres of PFYC 5 geologic units, with 130,700 acres in fossil areas. Also, among these are nine SDAs, totaling 19,850 acres, that are designated primarily for the protection of paleontological resources. Management of these areas provides direct and incidental protections for paleontological resources.

Because of the high percentage (approximately 84 percent) of highly sensitive PFYC 5 lands in the decision area, local surface geology and known localities are the primary references used by the BLM to assess resource potential and risk of impacts on a case-by-case basis. For comparison of alternatives on a resource management planning level, PFYC 5 lands are compared with management actions, although fossil localities can occur in geological units considered less sensitive under the PFYC system. Potential impacts on paleontological resources would be minimized as part of the process for reviewing actions that may involve surface disturbance.

Under all BLM alternatives, a lease notice would include protections for paleontological resources by restricting vehicles to existing roads and trails. This would require a pedestrian survey for paleontological material in PFYC unknown, 4, or 5 areas, or as determined by the BLM Authorized Officer. It also would require other reporting, avoidance, and mitigation measures, as appropriate. Additional requirements may be applied through COAs at the APD phase. These same requirements would apply for ROWs under all BLM action alternatives.

BLM No Action Alternative

The BLM No Action Alternative would continue the current management direction from existing planning documents. For paleontological resources, current management actions and stipulations for mineral leasing and development that would allow or limit surface uses would continue.

Allocations for fluid mineral resources by alternative and PFYC classification are presented in **Table 3-32**. Although 1,670,700 acres in PFYC 5 geologic units would remain open to fluid mineral leasing and potential development, only 18,500 acres of new surface disturbance resulting from oil and gas development are anticipated (**Appendix I**), and all ground disturbance would be subject to further site-specific review to avoid impacts on paleontological resources. Closures, NSO stipulations, and CSU stipulations reduce the potential for impacts on paleontological resources. CSU stipulations would continue to protect paleontological resources by restricting vehicles to existing roads and trails and requiring paleontological clearances for surface-disturbing activities.

The BLM No Action Alternative does not specify the types or extent of vegetation treatments. Such treatments would continue to be conducted on a project-specific basis, with the potential for surface disturbance of any fossils. All ground disturbance would be subject to further site-specific review to avoid impacts on paleontological resources.

BLM Alternative A

Vegetation Management

Under BLM Alternative A, vegetation treatments would be formally prioritized to meet defined management goals. They may include thinning, prescribed fire, selective herbicides, wood cutting, commercial cutting, seedings, shrub planting, and other approved treatments. Vegetation treatments would continue on a project-specific basis of limited acreages, with the potential for surface disturbance of fossils. All ground disturbance and increased activity in the vicinity of fossil localities would be subject to further site-specific review to avoid and minimize potential impacts on paleontological resources.

Table 3-32
Summary of Actions and Allocations by Alternatives that Overlap with PFYC 5 Geological Units for Paleontological Resources

Alternative	Total Acres of PFYC 5 Units in the Decision Area: 2,181,100 Acres								
	Closed to Fluid Mineral Leasing - Total	Closed to Fluid Mineral Leasing – PFYC 5	Open to Fluid Mineral Leasing - Total	Open to Fluid Mineral Leasing – PFYC 5	Open to Fluid Mineral Leasing - Standard Terms and Conditions - Total	Open to Fluid Mineral Leasing - Standard Terms and Conditions - PFYC 5	Open to Fluid Mineral Leasing - NSO - PFYC 5	Open to Fluid Mineral Leasing - CSU - PFYC 5	Open to Fluid Mineral Leasing - TL - PFYC 5
No Action Alternative	109,100	73,700	1,872,900	1,670,700	737,600	612,100	77,400	1,038,000	315,700
Alternative A	543,500	455,800	1,438,600	1,288,500	241,000	201,000	934,500	659,600	313,000
Alternative B1	726,500	565,900	1,255,600	1,178,500	188,700	166,000	556,100	858,900	129,200
Alternative B2	825,600	654,200	1,156,400	1,090,200	172,800	153,200	521,800	796,800	122,700
Alternative C1	109,100	73,700	1,872,900	1,670,700	685,100	567,300	103,500	1,073,000	315,700
Alternative C2	107,800	72,400	1,874,200	1,672,000	661,100	558,600	113,200	1,073,000	315,700
Alternative C3	107,800	72,400	1,874,200	1,672,000	633,900	546,300	129,300	1,073,000	315,700
Alternative C4	107,800	72,400	1,874,200	1,672,000	597,500	525,000	154,800	1,073,000	315,700
Alternative C5	107,800	72,400	1,874,200	1,672,000	558,100	500,900	189,600	1,073,000	315,700
Alternative C6	153,800	85,100	1,828,300	1,659,300	633,900	546,300	118,400	1,071,100	315,700
Alternative D	107,800	72,400	1,874,200	1,672,000	769,200	643,400	39,200	1,017,500	3,400

Source: BLM GIS 2019

Lands with Wilderness Characteristics

BLM Alternative A would manage 24,300 acres to protect wilderness characteristics as a priority over other multiple uses. Land uses that are incompatible with maintaining wilderness characteristics would not be allowed, providing incidental protection from ground disturbance and access for paleontological resources. Approximately 14,300 acres in PFYC 5 geologic units are included in proposed lands with wilderness characteristics. BLM Alternative A would also include PCAs totaling 6,800 acres, with 1,000 acres in PFYC 5.

Lands and Realty

BLM Alternative A would establish ROW exclusion and avoidance zones and utility corridors. ROW exclusion areas of 28,800 acres and ROW avoidance areas of 1,060,400 acres would prevent or avoid surface disturbance and decrease access that could cause impacts on paleontological resources in those areas. In paleontological avoidance areas, BLM Alternatives A through D specify vehicle restrictions, pedestrian surveys, discovery procedures, and avoidance, other mitigation or recovery for paleontological resources that may be encountered. The designation of a 2,500-foot-wide, 104,000-acre utility corridor would help contain future linear surface disturbance and impacts by reducing access outside the corridor. Through these measures, potential impacts on paleontological resources would be avoided or minimized.

BLM Alternative B

Vegetation Management and Lands with Wilderness Characteristics

The potential for impacts on paleontological resources from vegetation treatments and management of lands with wilderness characteristics would be the same as under BLM Alternative A.

Lands and Realty

Similar to BLM Alternative A, BLM Alternative B would establish ROW exclusion and avoidance zones and utility corridors. ROW exclusion areas of 24,800 acres and ROW avoidance areas of 956,100 acres would prevent or avoid surface disturbance and decrease access that could have impacts on paleontological resources in those areas. In paleontological avoidance areas, BLM Alternatives A through D specify vehicle restrictions, pedestrian surveys, discovery procedures, and avoidance, other mitigation, or recovery for paleontological resources that may be encountered. The designation of a 2,500-foot-wide, 127,000-acre utility corridor would help contain future linear surface disturbance and impacts as described under BLM Alternative A. In addition, BLM Alternatives B through D would widen existing pipeline corridors to accommodate an additional 23,000 acres, while avoiding ground disturbance and increased access in new areas. Through these measures, potential impacts on paleontological resources would be avoided or minimized.

Fluid Minerals

BLM Sub-Alternatives B1 and B2

Under BLM Sub-Alternatives B1 and B2, the potential impacts from oil and gas development would be similar to BLM Alternative A. As presented in **Table 3-32**, 1,178,500 acres and 1,090,200 acres in PFYC 5 geologic units would remain open to fluid mineral leasing and potential development under Alternatives B1 and B2, respectively. These would represent respective decreases of 29 and 35 percent from the BLM No Action Alternative. Likewise, acres in PFYC 5 geologic units closed to mineral leasing or subject to NSO stipulations would each increase over the BLM No Action Alternative to 565,900 acres (6.7 times more than the No Action Alternative) and 556,100 acres (6.2 times more than the No Action Alternative), respectively, under BLM Sub-Alternative B1 and 654,200 acres (7.8 times more) and 521,800 acres (5.7 times more), respectively, under BLM Sub-Alternative B2. Because only 16,600 acres of new surface disturbance resulting from oil and gas development are anticipated and all ground disturbance would be subject to further site-specific review, potential impacts on paleontological resources would be minimized or avoided (**Appendix I**).

BLM Alternative C (Includes BLM Sub-Alternatives C1 through C6; applying only to Fluid Minerals)

Vegetation Management

The potential for impacts on paleontological resources from vegetation treatments would be the same as under BLM Alternative A; impacts from management of lands with wilderness characteristics would be the same as under the BLM No Action Alternative.

Lands and Realty

BLM Alternative C would establish ROW exclusion and avoidance zones and utility corridors. ROW exclusion areas of 2,800 acres and avoidance areas of 5,900 acres would prevent or avoid surface disturbance and slightly decrease access that could have impacts on paleontological resources. As under BLM Alternative A, BLM Alternative C specifies vehicle restrictions, pedestrian surveys, discovery procedures, avoidance, other mitigation, or recovery for paleontological resources that may be encountered in ROWs. Utility corridor designations would be the same as under BLM Alternative B, which would help contain future linear surface disturbance and impacts by reducing access outside the corridor. Through these measures, potential impacts on paleontological resources would be avoided or reduced compared with the BLM No Action Alternative.

Fluid Minerals

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), BLM Alternative C includes six sub-alternatives that propose varied fluid mineral leasing management. The areas open and closed to fluid mineral leasing under BLM Sub-Alternatives C1, C2, C3, C4, and C5 are less than the BLM No Action Alternative by one percent, while under BLM Sub-Alternative C6 there is a 2.4 percent reduction. Likewise as presented in **Table 3-32**, acres in PFYC 5 geologic units open or closed to mineral leasing under BLM Sub-Alternatives C2 through C5 are the same, 1, 874,200 and 72,400 acres, respectively, which are similar to the BLM No Action Alternative. BLM Sub-Alternative C1 closes 109,100 acres to fluid mineral leasing, the same as the BLM No Action Alternatives, and leaves 1,872,900 acres open to fluid mineral leasing. The types of impacts would be similar to those described under *Impacts Common to All the BLM Alternatives*.

BLM Sub-Alternative C1

When compared with the BLM No Action Alternative, the acreage in PFYC 5 geologic units open to leasing with NSO stipulations under BLM Sub-Alternative C1 would increase by 34 percent to 103,000 acres. Areas closed to leasing or increases in areas with NSO stipulations for fluid mineral leasing could result in a lower potential for impacts from ground disturbance on paleontological resources compared with the BLM No Action Alternative.

BLM Sub-Alternative C2

When compared with the BLM No Action Alternative, the acreage in PFYC 5 geologic units open to leasing with NSO stipulations under BLM Sub-Alternative C2 would increase by 46 percent to 113,200 acres. Areas closed to leasing or increases in areas with NSO stipulations for fluid mineral leasing could result in a lower potential for impacts from ground disturbance on paleontological resources compared with the BLM No Action Alternative.

BLM Sub-Alternative C3

When compared with the BLM No Action Alternative, the acreage in PFYC 5 geologic units open to leasing with NSO stipulations under BLM Sub-Alternative C2 would increase by 67 percent to 129,300 acres. Areas closed to leasing or increases in areas with NSO stipulations for fluid mineral leasing could result in a lower potential for impacts from ground disturbance on paleontological resources compared with the BLM No Action Alternative.

BLM Sub-Alternative C4

When compared with the BLM No Action Alternative, the acreage in PFYC 5 geologic units open to leasing with NSO stipulations under BLM Sub-Alternative C2 would double to 154,800 acres. Areas closed to leasing

or increases in areas with NSO stipulations for fluid mineral leasing could result in a lower potential for impacts from ground disturbance on paleontological resources compared with the BLM No Action Alternative.

BLM Sub-Alternative C5

When compared with the BLM No Action Alternative, the acreage in PFYC 5 geologic units open to leasing with NSO stipulations under BLM Sub-Alternative C2 would increase by 144 percent to 189,600 acres. Areas closed to leasing or increases in areas with NSO stipulations for fluid mineral leasing could result in a lower potential for impacts from ground disturbance on paleontological resources compared with the BLM No Action Alternative.

BLM Sub-Alternative C6

When compared with the BLM No Action Alternative, the acreage in PFYC 5 geologic units open to leasing with NSO stipulations under BLM Sub-Alternative C2 would increase by 53 percent to 118,400 acres. Areas closed to leasing or increases in areas with NSO stipulations for fluid mineral leasing could result in a lower potential for impacts from ground disturbance on paleontological resources compared with the BLM No Action Alternative.

BLM Alternative D

The potential for impacts from oil and gas development would be similar to the BLM No Action Alternative. As presented in **Table 3-32**, 1,672,000 acres in PFYC 5 geologic units would remain open to fluid mineral leasing and potential development, which is the same as the BLM No Action Alternative. Likewise, acres closed to mineral leasing would be about the same. Land in PFYC 5 geologic units subject to NSO stipulations would be less than the BLM No Action Alternative and would decrease by 49 percent to 39,200 acres. Because only 18,200 acres of new surface disturbance resulting from oil and gas development is anticipated and all ground disturbance would be subject to further site-specific review, potential impacts on paleontological resources would be minimized or avoided (**Appendix I**).

BLM Alternative D would establish ROW exclusion and avoidance areas and utility corridors. ROW exclusion areas of 2,800 acres and ROW avoidance areas of 5,900 acres would prevent or avoid surface disturbance and slightly decrease access that could cause impacts on paleontological resources. As under BLM Alternative A, BLM Alternative D would specify vehicle restrictions, pedestrian surveys, discovery procedures, avoidance, other mitigation, or recovery for paleontological resources that may be encountered in ROWs. Utility corridor designations would be the same as under BLM Alternative B, which would help contain future linear surface disturbance and impacts by reducing access outside the corridor. Through these measures, potential impacts on paleontological resources would be avoided or reduced compared with the BLM No Action Alternative.

The potential for impacts on paleontological resources resulting from vegetation treatments would be the same as under BLM Alternative A; impacts from management of lands with wilderness characteristics would be the same as under the BLM No Action Alternative.

BIA Alternatives

Impacts Common to All BIA Alternatives

The BIA alternatives do not describe any actions that are specific to the management or protection of paleontological resources; however, the BIA seeks to minimize surface disturbance, in general. Under all its alternatives, the BIA would comply with NEPA and other relevant federal laws and regulations, as well as applicable Tribal laws or requirements of the Navajo Nation. Paleontological resources may be associated with cultural resources, and some fossils may also be considered CIMPPs that would be considered in the Section 106 process. Compliance with these requirements would include consideration of the potential for impacts on paleontological resources in BIA decisions resulting from fluid mineral leasing.

Under all BIA alternatives, additional surface disturbance from oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative.

BIA No Action Alternative

Fluid mineral leasing and exploration would be allowed on all of the 593,460 acres of the BIA mineral decision area (383,200 acres of Navajo Tribal trust minerals and 210,260 acres of individual Indian allotment minerals). Surface occupancy for fluid mineral leasing and exploration would be allowed on most of the 885,460 acres of the BIA surface decision area (657,360 acres of Navajo Tribal trust minerals and 210,106 acres of individual Indian allotment minerals).

Under the BIA No Action Alternative, lessees would continue to submit NEPA compliance documentation to the BIA or FIMO, as applicable, before entering leased land or disturbing the ground surface. The PFYC would be reviewed to assess the potential for impacts on paleontological resources during the APD phase and initial leasing action. The analysis would address impacts on the environment and natural resources and define surface protections. After analysis, the BIA and FIMO would continue to notify the lessee of the stipulations and the conditions governing proposed surface disturbance. Vehicular access to the well site would continue to be limited to the approved access road. Review under NEPA and other laws and policies and agency approval and consultation would include consideration of environmental concerns and impacts on a site-specific basis. They include stipulations for limiting surface disturbance. These actions would continue to protect and reduce the potential for impacts on paleontological resources from direct ground disturbance and access, while allowing the development of the mineral resource.

BIA Alternative A

The potential for impacts on paleontological resources would be similar to those of the BIA No Action Alternative. BIA Alternative A would clarify that all relevant and applicable federal and Tribal laws and requirements, including those of the Navajo Nation, apply to operators on split-estate with Tribal trust surface use agreements and federal minerals. It also would clarify that, on individual Indian allotment lands, NEPA compliance and documentation would be developed for the entire leased area; stipulations and conditions of approval would be subject to completing NEPA-required mitigation.

The BIA also would encourage that roads, utilities, and pipelines may share common ROWs to minimize surface disturbance and that all lessee vehicular access to the well site (on lease or off-lease) would be limited to the approved access road. Collocating infrastructure would minimize surface disturbances and reduce the potential for impacts on paleontological resources. Clear environmental review requirements and efforts to reduce surface disturbance by collocating infrastructure would minimize surface disturbances and reduce the potential for impacts on paleontological resources. These actions would protect and reduce the potential for impacts on paleontological resources from direct ground disturbance and access, while allowing the mineral resource to be developed.

BIA Alternative B

The potential for impacts on paleontological resources would be similar to that of BIA Alternative A. BIA Alternative B would include the authority to require directional drilling to minimize additional surface disturbance through collocation, and it specifies maintenance for dirt roads. These actions would reduce the potential for impacts on paleontological resources from direct ground disturbance, erosion, and access.

BIA Alternative C

The potential for impacts on paleontological resources under BIA Alternative C would be the same as under BIA Alternative B.

BIA Alternative D

The potential for impacts on paleontological resources under BIA Alternative D would be the same as under BIA Alternative B.

Cumulative Impacts

The cumulative impact analysis area for paleontological resources is the planning area, regardless of ownership. Past and present actions that have likely affected paleontological resources in this sensitive region may include such activities as oil, gas, and energy infrastructure development; agriculture and grazing; residential and commercial development; transportation infrastructure; dirt access roads and off-road vehicle use; mining and mineral use; vegetation management and fuel cutting; wildfire; unauthorized fossil collecting; recreation; and the effects of natural processes.

Reasonably foreseeable future actions with the potential to affect paleontological resources are similar to the past and present actions. In the planning area the development of fluid mineral resources would continue to be a major activity that would require ground disturbance from permanent and temporary roads, pits, drilled wells, associated well pads, pipelines, and transmission lines. Solar energy development is anticipated near existing transmission facilities. More development around towns and cities is also anticipated. This would accompany population growth, which may increase the potential for inadvertent impacts from recreation and opportunities for vandalism.

For actions on federally managed land and mineral estate, impacts would be minimized through existing laws, regulations, and stipulations addressing surface-disturbing activities in sensitive areas. All of the BLM and BIA action alternatives propose additional allocations, activities, reviews, and priorities that would reduce the potential for future actions to affect paleontological resources. Other ground-disturbing activities, such as road construction, land development, and utility infrastructure, may be reviewed by other federal, state, Tribal, or local agencies for impacts on paleontological resources, and steps would be taken to recover or avoid significant finds.

Actions on private land could result in the inadvertent destruction of paleontological resources or the removal of fossils without any scientific study. Population growth and increasing recreation demand can affect resources through unauthorized removal, vandalism, incremental damage of surface resources, and subsequent erosion.

Under all of the BLM and BIA alternatives, the potential for impacts on paleontological resources would be minimized through management objectives that protect paleontological resources in planning and avoiding disturbing sensitive formation and fossil localities. Paleontological resources would continue to be considered in management decisions, actions, and projects that may cause ground or other disturbance. Such projects could result in long-term direct damage to or loss of scientifically significant fossils or would contribute to erosion, exposure, or vandalism, without scientific study. The potential incremental contribution of the alternatives to cumulative impacts on paleontological resources, when combined with other past, present, and reasonably foreseeable actions, is expected to be less than significant.

3.4.11 Visual Resources

Affected Environment

Current Conditions

The landscape in the San Juan Basin is diverse, exhibiting many distinctive features and landforms found in arid regions where water and wind erosion have sculpted the land. It is an area of plateaus and broad valleys. Distinctive features are steep and colorful escarpments, broad vistas, rugged canyons, and pastel-colored badlands, dissected into plateaus and pinnacles. Sagebrush and grassland expanses are prominent in the central and southern portions of the FFO. Pinyon-juniper woodlands, rivers, and human-made structures, such as reservoirs, roads, and oil and gas wells, dominate the northern portion. Sightseeing is popular in the region, where scenic vistas are frequent along highways, high places, and riverfronts. Current conditions of visual resources in the BLM surface decision area are described in the 2003 RMP (BLM 2003).

Visual Resource Management

BLM VRM classes are defined in the 2003 RMP (BLM 2003). Neither the BIA nor Navajo Nation have established methods to inventory visual resources on Tribal lands; therefore, these agencies have not assigned VRM classes for the Tribal lands they administer.

Key Features

There are nine areas designated as VRM Class I in the planning area, as follows:

- Ah-shi-sle-pah Wilderness Area
- Bis Sa'ani ACEC
- Bisti/De-na-zin Wilderness Area
- Fossil Forest Research Natural Area (RNA)
- Halfway House ACEC
- Morris 4I ACEC
- Pierre's Site ACEC
- Twin Angels ACEC
- Upper Kin Klizhin ACEC

VRI Class I areas with high intrinsic scenic value and visual sensitivity in the FFO are the Bisti/De-na-zin and Ah-shi-sle-pah Wilderness Areas, and Fossil Forest RNA. Protecting vistas from outside influences in these areas is a concern. Also, the visual context is an important component of the cultural resource values of the Chacoan Outliers, Native American Use and Sacred Areas ACECs, and additional CIMPPs.

BIA visual sensitive areas are important cultural, archaeological, and wildlife areas, as well as CIMPPs. These areas are not defined with boundaries but are found throughout the planning area. The resources of interest in BIA sensitive areas are discussed generally in their specific resource sections (**Section 3.4.3**, Water Resources; **Section 3.4.7**, Wildlife; **Section 3.4.8**, Special Status and Listed Species; **Section 3.4.9**, Cultural Resources; and **Section 3.4.10**, Paleontological Resources). These sensitive areas also contribute to the visual landscape of the planning area.

Dark Night Skies

The preservation of dark night skies is an emerging issue relevant to BLM-managed lands. Dark night skies are important to many users of those lands. The Bisti/De-na-zin Wilderness in particular has become well known for its unique dark night sky enjoyment and photography opportunities. The NPS manages adjacent lands in the CCNHP within the Planning Area, and it is mandated to preserve, to the greatest extent possible, the natural lightscapes of the park. These are the natural resources and values that exist in the absence of human-caused light (NPS 2006, p. 57).

CCNHP representatives have expressed concerns about night sky conditions and impacts on the national park from development on BLM- and BIA-managed lands. The park has a night sky initiative that offers astronomy as part of its interpretive programs. These programs emphasize the practices of the Chacoan people a thousand years ago, as well as modern approaches to viewing the same night sky they viewed. In order to maintain the night sky in similar conditions it is important that the area remain in a remote environment with clear dark skies, free of light pollution. The park was certified as an International Dark Sky Park by the International Dark-Sky Association on August 19, 2013. It is the twelfth park to receive the designation worldwide and the fourth unit of the US National Park System to receive the designation (NPS 2014).

Dark skies are culturally important to Tribes in the planning area. The Navajo Nation use the word Yáidíhíł for the universe, cosmos, or outer space; it represents the duality of the earth and sky. The ability to see constellations, as well as negative space between stars, is important to Navajo culture. Dark skies are also important for prayers and ceremonies, such as Holy Ways. Examples are the Night Way Ceremony (Tł'éejí

hataáí), Blessing Way, Mountain Top Way, Shooting Way, Beauty Way, Evil Way, and Windways. It also fits into non-Holy Way ceremonies, such as the Enemy Way. Yádiłhił is important for certain CIMPPs and the related ceremonies practiced there.

In addition, Yádiłhił incorporates the traditional Navajo calendar, which identifies the cycle of the Navajo seasons of fall, winter, spring, and summer. It also gives Navajos a map of when certain activities can be done by tracking the constellations in the dark skies.

Trends

The visual landscape in most of the planning area has been considerably modified due to the proliferation of gas wells, pipelines, and access roads. The visual character of areas with substantial oil and gas development has progressively changed over the last several decades. These activities disturb the surface, which removes or disturbs the top layers of soil or vegetation to reveal colors that contrast with the surrounding landscape.

Infrastructure associated with this development, such as utility lines, roads, and mineral resource extraction structures, add cultural modifications to the landscape and create disturbances that change the vegetation pattern, the texture of the landscape, and the colors of the area. Flaring and artificial lighting associated with oil and gas and other development has decreased night sky visibility. These impacts are expected to continue as development in the planning area continues.

Environmental Consequences

BLM Alternatives

There are no BLM decisions being considered that would affect visual resources beyond the impacts analyzed in the 2003 RMP and the 2014 Visual Resource Management Amendment. The BLM may further reduce impacts on night skies and visual resources by applying COAs at the APD phase (see **Appendix C**). Further analysis will occur during that phase. The BLM will also follow guidance suggested in the Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Managed Lands (USDOJ 2013), to offer BMPs for siting and design of energy projects that would mitigate visual impacts; therefore, impacts on visual resources from BLM alternatives are not discussed in the FMG RMPA/EIS.

BIA Alternatives

The BIA does not have a VRM system, nor does it maintain a visual resources inventory; however, it does use the BLM's VRI as guidance at the leasing level, and the BLM uses VRI at the site-specific, APD level. The BIA alternatives do not apply NSOs, CSUs, TLs, or other designations limiting the locations of oil and gas development; therefore, there are no differences by alternative in acreage amounts open to development. Instead stipulations are applied in line with the focus of each alternative.

Impacts Common to All BIA Alternatives

Although the BIA does not apply general designations limiting the locations of oil and gas development, under all its alternatives, the BIA would comply with NEPA and other relevant federal laws and regulations, applicable Tribal laws, and requirements of the Navajo Nation. Compliance with these requirements would consider the potential for impacts on visual resources in BIA decisions resulting from fluid mineral leasing and ROW development.

Under all the BIA alternatives, fluid mineral leasing and exploration would be allowed on all 383,200 acres and 210,300 acres of respective Navajo Tribal trust and individual Indian allotment minerals in the BIA mineral decision area. Surface occupancy for fluid mineral leasing and exploration would be allowed on most of the 657,400 acres and 210,100 acres of respective Navajo Tribal trust and individual Indian allotment minerals of the BIA surface decision area. Facilities associated with mineral development would add artificial elements, such as cultural modifications, to the landscape. These areas would be cleared of vegetation, thereby contrasting with the surrounding landscape. The form, line, color, and texture of these facilities would not resemble nearby structures, unless they are collocated with similar existing industrial facilities.

The visibility of the facilities would vary, depending on viewer distance and location, topography, color and composition of the facilities, and screening vegetation.

For nonproducing wells that are not reconditioned to produce water for domestic, agricultural, or livestock use by the landowner, the lessee would remove all pumping equipment on lease expiration and would plug the well. Removing the equipment would minimize long-term impacts on visual resources.

Proper surface reclamation, as required by appropriate provisions of Title 25, 36, and 43 CFRs and any other applicable regulations and manuals of the Secretary of the Interior, would minimize long-term impacts on visual resources. During permitting for development of the lease, the FIMO has the authority to issue stipulations and conditions to reduce visual impacts. Likewise, after production, the required removal of the equipment and proper surface reclamation would minimize long-term impacts on visual resources.

BIA No Action Alternative

The BIA's Forest and Land Protection Stipulation would require a site development and layout plan and a construction plan; any revisions would be submitted in advance to the Secretary of the Interior for approval. Additionally, the Secretary's prior authorization would be required to cut, destroy, or damage timber for mining operations. This would provide the Secretary with an opportunity to review the plans and make recommendations on reducing any project impacts on visual resources.

Removing water pumping equipment and properly reclaiming the surface, as required under this alternative, would minimize long-term impacts on visual resources.

New roads to access development sites would add artificial elements to the landscape. Improving roads typically enhances the contrast of the road with the adjacent landscape. Roads lack vegetation and create an abrupt vegetation edge along the roadside. Smooth roads would stand out against the moderately coarse texture of the terrain. This would affect visual resources by dividing the landscape with areas that lack vegetation and altering the natural topography and the texture and color of the land surface. The visibility of the new and improved roads would vary, depending on viewer distance and location, topography, and screening vegetation. Limiting vehicular access to the well site to the approved access road would reduce the impacts of new road development.

Requiring oil and gas well setbacks up to 500 feet from houses, structures, and water bodies would continue to limit visual impacts in these areas. Impacts could still occur in the foreground. Visual resources and CIMPPs (including the Navajo concept of Yádiłhił) would continue to be impacted by light pollution. Impacts could be mitigated if the BLM applied night skies COAs at the APD phase (see **Appendix C**).

Impacts Common to All BIA Action Alternatives

New roads to access development sites would add artificial elements to the landscape. Improving roads typically enhances the contrast of the road with the adjacent landscape. Roads lack vegetation and create an abrupt vegetation edge along the roadside. Smooth roads would stand out against the moderately coarse texture of the terrain. This would affect visual resources by dividing the landscape with areas that lack vegetation and altering the natural topography and the texture and color of the land surface. The visibility of the new and improved roads would vary, depending on viewer distance and location, topography, and screening vegetation. Under all BIA action alternatives, the citation of failure to limit travel to the approved access road as a violation of the lease would provide the BIA more authority than as a trespass violation under its No Action Alternative.

BIA Alternative A

Roads, utilities, and pipelines may share common ROWs to limit surface disturbance. Interim reclamation would be required to reestablish local native vegetation in area of disturbance. As part of interim reclamation, the footprint of disturbance would be minimized by reclaiming all portions of the cleared areas not needed

for production, operations, transportation, or safety purposes. These would be contoured with stockpiled topsoil to a final or intermediate contour that blends with the surrounding topography as much as possible.

Operators would ensure that dirt roads are maintained in accordance with CWA 404, 401, and 402 standards and in accordance with BLM standards on road maintenance and erosion. Actions to restrict or prohibit surface-disturbing activities to protect vegetation communities can help to maintain the scenic quality of an area by maintaining or limiting changes to vegetation and color. Under BIA Alternative A, the use of common ROWs, interim reclamation, and road maintenance, would reduce impacts on visual resources, as compared with the BIA No Action Alternative.

Under BIA Alternative A, the lessee would agree to conduct all operations authorized by the lease with due regard for proper land management, as follows:

- Avoid unnecessary damage to wildlife and vegetation species, timber, crops, or other cover, and to improvements, such as roads, bridges, cattle guards, and telephone lines
- Control soil erosion resulting from the operation, to prevent pollution of soil and water resources
- Fence all sump holes or other excavation made by lessee, whenever required by the FIMO director or authorized representative
- Not destroy or damage woodlands or vegetation

These management requirements would help protect scenic quality that could be directly changed in the short term by changing landscape color and vegetation. In the long term, once desired vegetation becomes established and matures, it can indirectly create a landscape with vegetation and color that does not contrast with the local visual landscape. In general, surface disturbance from mineral development would directly decrease the scenic quality by changing vegetation and color. Actions to restrict or prohibit this surface disturbance can maintain the scenic quality of an area by preserving vegetation and color in the long term.

Under BIA Alternative A, the lessee would not drill any well within 1,320 feet (0.25 miles) of residential or community structures. By providing this restriction zone for facilities used by people, impacts on visual resources would be removed from the immediate foreground by 820 feet (250 meters) farther than under the BIA No Action Alternative. There would still be impacts on visual resources in the foreground of the facilities. Specific mitigation measures assigned through the use of COAs at the APD phase could further add direct or indirect protection of visual resources.

Under BIA Alternative A, implementing measures to control lighting and light resulting from flaring on well sites and off-site facilities would limit light pollution, especially in wildlife habitat and nesting areas. The lighting measures could include down lighting, flare shielding, and alternate lighting colors. Mitigation measures would help decrease the level of impacts on night skies and of visual resources on surrounding residents and wildlife. When compared with the BIA No Action Alternative, protective measures under BIA Alternative A would provide more opportunities for protecting CIMPPs (including the Navajo concept of *Yádiłhił*) and preventing light pollution.

BIA Alternative B

Directional drilling may be required, where practical, to collocate wells to reduce road, well pad, and utility surface disturbance. To minimize surface disturbance, roads, utilities, and pipelines may share common ROWs. Access roads would be designed to follow the contour of the landform and mimic lines in vegetation. This can necessitate constructing longer access roads, which could increase visual impacts.

Interim reclamation would be required for the reestablishment of local native vegetation on well locations. As part of interim reclamation, the footprint of disturbance would be minimized by reclaiming all portions of the cleared areas not needed for production, operations, transportation, or safety by recontouring with stockpiled topsoil to blend with the surrounding topography as much as possible.

Under BIA Alternative B, the lessee would agree to the following:

- Conduct all operations authorized by this lease with due regard for proper land management
- Avoid unnecessary damage to cultural resources, burial sites, and improvements, such as roads, bridges, cattle guards, and telephone lines
- Fence all sump holes or other excavation made by lessee, whenever required by the FIMO director or authorized representative
- Refrain from destroying or damaging woodlands and vegetation

Avoiding or mitigating disturbance to sensitive resources would allow for indirect protection of visual resources.

Under the BIA Alternative B, operators would ensure that dirt roads are maintained in accordance with the CWA 404, 401, and 402 standards and in accordance with BLM standards for road maintenance and erosion. Maintenance of access roads would indirectly limit impacts on visual resources.

Under BIA Alternative B, directional drilling may be required to hide proposed well locations from culturally sensitive viewpoints. These viewpoints may not be located on the proposed lease and would be defined through consultation with the BIA, Navajo Nation, other Tribes with CIMPPs in the viewshed, and local communities. Visual impacts on these receptors would be reduced under this alternative, compared with the BIA No Action Alternative.

In general, surface disturbance from mineral development would directly decrease the scenic quality by changing vegetation and color. Actions to consolidate this surface disturbance can minimize impacts on the scenic quality of an area by preserving vegetation and color in the long term. Under BIA Alternative B, use of common ROWs, interim reclamation, and road maintenance would reduce impacts on visual resources, as compared with the BIA No Action Alternative.

Under the BIA Alternative B, the lessee would not drill any well within 1,320 feet (0.25 miles) of a residential or community structure. Impacts would be the same as described under BIA Alternative A.

Under BIA Alternative B, implementing measures to control lighting and light resulting from flaring on well sites and off-site facilities would limit light pollution. The lighting measures should emphasize limiting light pollution at views seen from key cultural resources identified by the NPS, Navajo Nation, or other Tribes. The lighting measures could include downlighting, flare shielding, and alternate lighting colors. Mitigation measures would help decrease the level of impacts on night skies and visual resources on surrounding residents. When compared with the BIA No Action Alternative, protective measures under BIA Alternative B would provide more opportunities for protecting CIMPPs (including the Navajo concept of Yáidíłíí) and preventing light pollution.

BIA Alternative C

Directional drilling may be required, where practical, to collocate wells to reduce road, well pad, and utility surface disturbance. To minimize surface disturbance, roads, utilities and pipelines may share common ROWs. Access roads would be designed to follow the contour of the landform or to mimic lines in vegetation. This can necessitate constructing longer access roads, which could increase impacts on visual resources. Impacts on visual resources would be the same as described under BIA Alternative B.

Interim reclamation would be required for the reestablishment of local native vegetation on well locations. Impacts on visual resources would be the same as described under BIA Alternative B.

Under BIA Alternative C, the lessee would agree to the following:

- Conduct all operations authorized by this lease with due regard for proper land management
- Avoid unnecessary damage to cultural resources, burial sites, and improvements, such as roads, bridges, cattle guards, and telephone lines

- Fence all sump holes or other excavation made by lessee, whenever required by the FIMO director or authorized representative

Requirements under BIA Alternative C would provide more indirect protection to visual resources with the inclusion of CIMPPs, health and safety, and Indian trust assets than that provided under BIA Alternative A.

Under BIA Alternative C, the lessee would refrain from destroying or damaging woodlands and vegetation. Impacts would be the same as described under BIA Alternative A, which would provide overall protection similar to what would be required under the BIA No Action Alternative.

Impacts from removing water pumping facilities and reclaiming the surface would be the same as those described under BIA Alternative A.

Under BIA Alternative C, operators would ensure that dirt roads are maintained, in accordance with CWA 404, 401, and 402 standards and in accordance with BLM standards on road maintenance and erosion. Impacts would be the same as those described under BIA Alternative A.

Directional drilling may be required to hide proposed well locations from culturally sensitive viewpoints. Impacts would be the same as those described under BIA Alternative B.

Impacts of the 1,320-foot (0.25-mile) setback from residential or community structures would be the same as those described under BIA Alternative A.

Under BIA Alternative C, implementing measures to control lighting and light resulting from flaring on well sites and off-site facilities would limit light pollution. The lighting measures should be considerate of locations significant to local residents, such as residential and community structures. The lighting measures should include downlighting, flare shielding, alternate lighting colors, and timing restrictions.

Operators would be required to notify the community one week in advance of flaring and to provide flaring information. Impacts would be similar to those described under BIA Alternative A, except that under BIA Alternative C, restrictions and notification requirements would provide more direct protection of night skies and visual resources for local residents. There would be fewer impacts under BIA Alternative C than under the BIA No Action Alternative.

BIA Alternative D

To minimize surface disturbance, roads, utilities and pipelines may share common ROWs. Infrastructure siting would accommodate the needs of the landowner. Interim reclamation would be required for the reestablishment of local native vegetation on well locations. Impacts would be the same as those under BIA Alternative A. There would be more protection to visual resources under BIA Alternative D than under the BIA No Action Alternative. Consolidating disturbance into common ROWs would help limit the potential for surface disturbance and direct and indirect impacts on visual resources.

Under BIA Alternative D, the lessee would agree to the following:

- Conduct all operations authorized by this lease with due regard for proper land management
- Avoid unnecessary damage to vegetation species, timber, crops, or other cover and to improvements, such as roads, bridges, cattle guards, and telephone lines
- Control soil erosion resulting from the operation to prevent pollution of soil and water resources
- Fence all sump holes or other excavation, whenever required by the FIMO director or authorized representative

These requirements would provide protection similar to that under the BIA No Action Alternative.

The lessee would minimize destruction and damage to woodlands. This alternative would provide the least protection, as compared with the other alternatives, because the requirement would be to minimize, instead of refrain from, destruction to woodlands. This would indirectly provide less protection to visual resources.

For leases on Navajo Tribal trust lands, operators would ensure that dirt roads are maintained in accordance with CWA 404, 401, and 402 standards and in accordance with BLM standards for road maintenance and erosion. For leases on individual Indian allotments, measures to prevent erosion of roads that would not be reclaimed would be established through coordination with the landowner. Under this alternative, only leases on Navajo Tribal trust land would be subject to this stipulation; however, there would be more clear direction under BIA Alternative D, when compared with the BIA No Action Alternative.

Under BIA Alternative D, the lessee would not drill any well within 500 feet of residential or community structures on Navajo Tribal trust lands. On individual Indian allotted lands, the lessee would not construct any well pad location within 200 feet of any structures or improvements—or at a distance approved by the allottee—without the Indian surface owner’s written consent. Impacts would be similar to those described under the BIA No Action Alternative; however, under Alternative D, there would be less direct protection of water bodies, as described in the BIA No Action Alternative.

Under BIA Alternative D, implementing measures to control lighting and light resulting from flaring on well sites and off-site facilities would limit light pollution. Operators would be required to notify the community one week in advance of flaring and to provide flaring information. There would be more protection of visual resources under BIA Alternative D than under the BIA No Action Alternative.

Cumulative Impacts

Cumulative impacts on visual resources are the result of past, present, and reasonably foreseeable future actions in the planning area that increase or decrease the visual quality of the landscape to the point where a future VRI would recommend a change in the existing VRI classification.

Projects and activities identified as having the greatest likelihood to generate potential cumulative impacts when added to the BLM and BIA alternatives under the FMG RMPA/EIS are displayed in **Table 3-2**. Of the items in the table, the following past and present topics involve the most notable impacts on visual resources:

- Energy and minerals development
- Lands and realty
- Vegetation management

Because the BLM and BIA administer more than 50 percent of the surface land and split-estate in the planning area, cumulative impacts would be the result of activities both outside and inside the decision areas. The placement of up to 3,096 new oil and gas wells in and outside the BLM and BIA decision areas would modify visual landscapes, particularly in areas where oil and gas production is not already occurring (**Appendix I**). The 2003 RMP would continue to guide visual resource management in the BLM surface and mineral decision areas.

The most significant regional or national demand placed on visual resources in the planning area results from the development of fluid mineral resources, which includes such surface-disturbing activities as mineral extraction and ROW development. Continued fluid mineral development generally requires both permanent and temporary roads, pits, drilled wells, and associated well pads. In addition, fluid mineral development may require associated pipelines and transmission lines and the necessary service roads for these facilities. Impacts from fluid mineral management on BLM-managed, BIA-managed, and other surface management agency lands may result in additional surface disturbance from exploration and development; however, the required stipulations to protect important values would incidentally protect visual resources.

Cumulative impacts on visual resources could increase over time. Under the BLM and BIA No Action Alternatives, CSU stipulations are applied to minimize cumulative impacts. Overall management actions that would prevent or minimize cumulative impacts would increase under BLM and BIA Alternatives A, B, C, and D.

BLM and BIA Alternative A would have the most management actions that would prevent or minimize cumulative impacts on visual resources; however, under all action alternatives, preventing or minimizing surface disturbances would be emphasized to prevent or minimize cumulative impacts. In addition, vegetation treatments can help maintain and improve conditions for visual resources under all action alternatives. Implementing COAs and BMPs would further reduce cumulative impacts on visual resources, if these measures were applied at the permitting phase.

Currently, total surface disturbance in the planning area is 56,500 acres. The 2019 RFD projects that under the BLM and BIA No Action Alternatives the maximum total surface disturbance would be approximately 75,000 acres (18,500 acres of potential disturbance from future projects; **Appendix I**). Additionally, the 2019 RFD projects that based on interim reclamation, the total surface disturbance at the end of the plan (2037) would be between 42,100 and 42,800 acres (**Appendix I**). Projected surface disturbance from oil and gas development in the planning area and impacts on visual resources would be the lowest under BLM and BIA Alternatives A and B, the next lowest under BLM and BIA Alternatives C, and the highest under BLM and BIA Alternatives D and the BLM and BIA No Action Alternatives. The range of projected new disturbance from future projects across the alternatives spans 1,800 acres.

Cumulative impacts would be similar for BLM and BIA Alternatives B and C, but the location and intensity of impacts may vary. The BIA and BLM No Action Alternatives would not change current management actions, but they would continue to contribute to cumulative impacts. This would depend on restrictions on surface-disturbing activities on BIA- or BLM-managed lands.

Fewer cumulative impacts on BIA-managed lands under BLM and BIA Alternatives A, B and C would be the result of management minimizing or avoiding new surface disturbance. Of the action alternatives, BLM and BIA Alternative D would have the most incremental cumulative impacts. This is because of fewer restrictions on mineral development. On BIA-managed lands, mitigation requirements for new surface disturbance would reduce visual impacts from new developments.

3.4.12 Noise Resources

Affected Environment

The information in this section is for both BLM- and BIA-managed lands. Where available, BLM- or BIA-specific information is also identified. Any Indian trust assets involving noise resources are discussed under **Section 3.7.1**.

Current Conditions

Noise is defined as unwanted sound that can be intermittent or continuous, steady or impulsive. Human response to noise varies according to the type of noise source, the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source and the receptor. Exposure to loud noise can cause hearing loss; however, the primary human response to noise is annoyance.

The decibel is the unit of measurement used for sound pressure levels. The most common method for describing noise levels is the long-term equivalent dBA sound level. **Table 3-33** describes typical noise levels and general human responses to those sounds.

In general, the intensity of noise dissipates as it travels away from the source, resulting in a decrease in loudness. If unobstructed, such as by topography or vegetation, a doubling of distance from the noise source results in an approximately 6-decibel reduction in sound pressure level (La Plata County 2002).

Terrain can create lower or higher noise levels in certain areas. Vertical relief, such as hillsides or canyon walls, can attenuate noise but can also reflect sound and create an echo. Generally, for every 3.5 feet of vertical relief above the line of sight from a noise source, there will be a 1.5 dBA noise reduction (La Plata County 2002). Valleys channel sound and maintain higher noise levels at greater distances from the noise source.

Table 3-33
Characterization and dBA of Common Sounds

Characterization	dBA¹	Example Noise Condition or Event
Painful and dangerous	140	Fireworks
	130	Ambulance; jackhammer
Uncomfortable	120	Jet engine at take off
Very loud	110	Concert or sporting event; car horn
	100	Snowmobile
	90	Power lawnmower or power tool
	89	Oil and gas compressor facility
	83	Oil and gas well drilling
	82	Oil and gas pump jack operation
	80	Alarm clock
	71	Oil and gas water injection facility
Moderately noisy	70	Automobile traffic
	60	Normal conversation
	50	Moderate rainfall
Soft	40	Quiet library
	30	Whisper
Faint	20	Leaves rustling
Threshold of hearing	0-10	Audiometric testing booth

Source: American Academy of Audiology 2010; BLM 2003

¹Sound levels are based on highest measured sound levels and are normalized to a distance of 50 feet from the noise source.

Vegetation typically attenuates sound moving outward from a noise source. The planning area's dry climate limits vegetation growth, which allows for greater noise dispersion, compared with areas with taller and denser vegetation.

Local weather conditions also contribute to ambient noise conditions and influence noise dispersion. Ambient noise during fair weather is lower than during windy or rainy conditions. Wind is the most frequent source of weather-related noise. During times of stronger winds, the noise created can drown out other sounds.

Where there are such structures as oil and gas drilling and pumping equipment, transmission lines, and communication towers, wind often generates eolian noise,¹⁰ which is the result of wind blowing through the structures. Eolian noise levels fluctuate, due to the combination of such variables as wind speed, direction, and structure type and design. Wind also carries noise, especially when channeled by the terrain. The macro- and micro-climate conditions that produce wind also influence the direction, intensity, and duration of noise propagation from a given noise source.

The noise sources in the planning area primarily are oil and gas operations, urban areas, transportation routes, access roads, and aircraft. Outside the urban areas of Farmington, Aztec, and Bloomfield, the primary source of human noise is oil and gas activity. Other noise sources in the planning area are sporadic and localized, for example airplanes passing overhead.

During construction of oil and gas well pads, maximum cumulative noise levels from heavy equipment can reach 85 dBA at 50 feet, decreasing to 55 dBA at 1,500 feet from the pad. During drilling, noise levels can exceed 70 dBA at 200 feet, decreasing to approximately 64 dBA at 500 feet, 60 dBA at 1,000 feet, and 50 dBA at 3,000 feet. The maximum noise levels from pumping are typically less than 70 dBA at 50 feet, less than 50 dBA at 500 feet, and approximately 40 dBA at 1,000 feet (La Plata County 2002). Noise produced

¹⁰ Sighing or moaning sound

during operation is mostly from compressors. Exact noise levels at a given distance and time depend on the types of equipment, terrain features, and weather.

Where oil and gas operations and other human-caused noise sources are absent, typical ambient noise levels are 40 dBA during the day and 30 dBA at night (BLM 2009).

Current BLM noise guidance (FFO Noise NTL 04-2 FFO) defines noise-sensitive areas (NSAs) and establishes the threshold for continuous noise at NSA receptors and boundaries. At these locations, the sound level must be less than or equal to 48.6 dBA over a continuous 24-hour period (dBA Leq). This standard applies to oil and gas lease operators who intend to operate for more than a week and more than 8 hours a day.

The BIA does not have similar guidance for noise associated with oil and gas development.

In addition to noise levels measured on the dBA Leq scale, as outlined in the Management of Sound Generated by Oil and Gas Production and Transportation (NTL 04-2 FFO), oil and gas drilling and production may be measured on the dBC Leq scale. This is to identify the impact of low-frequency noise (below 100 Hz) on the environment, especially when operations occur within 0.25 miles of occupied buildings. Rather than being considered audible or loud, low-frequency noise is experienced more as a rumbling or vibration sensation. No national BLM or BIA guidance exists to manage low-frequency noise; however, COAs that could be applied to address this issue are identified in this RMPA/EIS (see **Appendix C**, Section C.1.3).

NSA receptors are locations where noise would be most likely to disrupt normal activities or to create the greatest potential for annoyance. Receptors on BLM-managed lands in the planning area are visitor use areas, camping and picnic areas, and recreation trails. Cultural areas, such as CIMPPs and the CCNHP, as well as habitat for sensitive species can also be considered sensitive noise receptors. NSA receptors can be a single point, such as a picnic area, or several acres, such as habitat for a sensitive species or wilderness areas.

Other NSA receptors in the planning area, including on Tribal trust and allotted lands but not on BLM-managed lands, are residences, places of worship, hospitals, and schools. Local government land use ordinances or Tribal land use planning standards for residential and commercial development typically include noise standards. In the absence of local policies, the BLM would enforce the maximum 48.6 dBA Leq standard at these receptor locations.

No similar policy standard exists for the BIA.

The FFO Noise NTL also identifies boundary-focused NSAs, which include the Bisti/De-na-zin and Ah-shi-sle-pah Wilderness Areas. The maximum noise level permitted at the boundary of these areas is 48.6 dBA Leq.

The BLM's NTL allows for more stringent standards, depending on the site-specific factors of topography, resource values and uses, and the potential impact of noise on existing resources and uses. The BLM considers these factors on a case-by-case basis during the implementation phase, for example when reviewing a proposed oil and gas APD. The BIA may consider similar standards, as applicable, to avoid excessive noise on adjacent receptors.

Trends

Overall noise trends in the planning area are expected to resemble baseline conditions; however, there will be localized noise level increases as more oil and gas wells are developed.

Environmental Consequences

BLM Alternatives

Impacts Common to All BLM Alternatives

Details on the nature and type of impacts are located in the Environmental Consequences Supplemental Report, Section E.C.2.12, Noise Resources.

Lands and Realty

ROW exclusion and avoidance areas, under all BLM alternatives, would reduce impacts from noise associated with ROW development within those areas and immediate surroundings. Noise created during construction of pipeline ROWs would be short term and temporary. Access road construction use and maintenance would increase noise within areas not previously developed with roads.

Fluid Minerals

Under all BLM alternatives, on 54,100 acres associated with wilderness and other legislatively designated areas, there would be no fluid mineral leasing or related activities capable of generating noise above ambient noise levels. These nondiscretionary closures would result in no change in noise levels at these sensitive noise receptors or wilderness boundaries from fluid mineral development.

Similarly, managing 35,800 acres associated with 13 ACECs as closed to new leasing under all alternatives would avoid changes in the ambient noise levels in these areas from fluid mineral development.

Collaborating with other agencies and interested parties would likely address the potential for increased noise levels from fluid mineral development at other sensitive receptors. Impacts of management on the setting of CCNHP and other cultural resources, including noise levels, are discussed in more detail in **Section 3.4.9**, Cultural Resources. If the BLM applied COAs to fluid mineral well pad construction, drilling, operation, and maintenance that address noise generated from those activities, including low-frequency noise, the COAs would minimize impacts on sensitive noise receptors.

BLM No Action Alternative

Vegetation Management

BLM would continue current vegetation management practices under the 2003 RMP and would not identify specific acreages for vegetation treatments or assign specific priority levels for the treatments. Therefore, impacts on sensitive receptors from noise generated by vegetation treatments could occur across the field office and would likely be short term and temporary.

Lands with Wilderness Characteristics

Under BLM No Action Alternative, the BLM would not manage Lands with Wilderness Characteristics as a priority over other resources. This would not provide protection from impacts on these sensitive receptors from noise associated with development within these areas.

Fluid Minerals

Under the BLM No Action Alternative, 109,100 acres (approximately 5 percent of the BLM mineral decision area) would continue to be closed to fluid mineral leasing and exploration. There would be no noise-related impacts from fluid mineral activity in these areas; however, noise from fluid mineral activity on adjacent open areas would directly contribute to noise levels in closed areas. Vehicle traffic from fluid mineral activity on roads, crossing areas closed to drilling, would also increase noise in these closed areas.

On the 4 percent of the BLM mineral decision area managed as NSO (83,800 acres), there would be no noise from fluid mineral well pad construction, well drilling, operation or maintenance. Noise from fluid mineral activities on adjacent areas would contribute to noise levels in areas managed as NSO. The potential for noise impacts in closed and NSO areas would be where open areas with fluid mineral activity are next to the closure or NSO boundary. In closed or NSO areas that are farther away from the boundary, impacts would be less from activity on adjacent open areas.

The greatest potential for increased ambient noise levels would be in areas managed as open, with standard terms and conditions. There would be no specific stipulations or limitations on noise levels from well pad construction, well drilling, operation, or maintenance. Sensitive noise receptors near fluid mineral well sites, access roads, and pipelines would experience increased noise levels during construction. Following well pad construction and well drilling, there would be ongoing noise from well operations. The greatest potential for impacts on sensitive noise receptors would be during the nighttime, when the ambient noise levels are lower. Wells that use compression technology would result in the highest noise levels and greatest impacts on nearby sensitive noise receptors.

Noise impacts from vehicle traffic on access roads would be greatest during well pad construction and drilling. This is when the most and largest size vehicles would be using the roads. Vehicle noise during operation and maintenance would be less than during construction and drilling. Vehicle trips would also be less frequent, resulting in fewer impacts on sensitive receptors near access roads. Noise impacts from pipelines would occur during construction and maintenance. Operational pipelines would not noticeably increase ambient noise levels, resulting in negligible impacts on sensitive noise receptors.

Areas open to leasing with CSU stipulations (1,112,600 acres; 55 percent of the BLM mineral decision area) would also experience noise from fluid mineral drilling and construction; however, stipulations in Appendix C of the 2003 RMP (BLM 2003) could limit the intensity of impacts on some sensitive noise receptors.

Areas open to leasing with TLs (316,300 acres; 16 percent of the BLM mineral decision area) would experience reduced noise levels from fluid mineral activity. Reduced noise levels would be the result of seasonal restrictions on construction and drilling in important wildlife areas, which would generally apply from November 1 through June 15. In areas managed with TLs not already covered by an NSO or CSU stipulation, the maintenance and operation of wells, access roads, and pipelines would contribute to year-round noise levels, including at sensitive receptor locations.

Impacts Common to All BLM Action Alternatives

Vegetation Management

Under all BLM Action Alternatives, 1,315,600 acres have been identified for vegetation treatments, through 3 differing priority levels per action alternative. Noise from mechanical equipment (tractors, mowing, etc.) used in vegetation treatments, is not anticipated to exceed 117 dBA. Vegetation treatments would follow TLs for other sensitive resources during critical seasons, such as raptor nesting season, should they be located within proximity to the sensitive receptors. Impacts on sensitive receptors from noise created by vegetation treatments would be short term and temporary.

BLM Alternative A

Lands with Wilderness Characteristics

Under BLM Alternative A, the BLM would manage 24,300 acres of lands managed to protect wilderness characteristics as a priority over other multiple uses. Additionally, mechanical or surface disturbing vegetation treatments would not be allowed within the lands managed to protect with wilderness characteristics. Management of the 24,300 acres within Units 069, 075 and 082 would reduce impacts associated with noise created through development. Reducing the potential for noise within these areas may have beneficial impacts for sensitive receptors within the boundaries of the units.

Fluid Minerals

BLM Alternative A would result in 543,500 acres (27 percent of the BLM mineral decision area) being closed to fluid mineral leasing and exploration. There would be no noise-related impacts from fluid mineral activity in these areas; however, noise from fluid mineral activity on adjacent open areas would still contribute to noise levels in closed areas. Compared with the BLM No Action Alternative, closing a larger portion of the decision area would result in fewer instances of noise impacts from fluid mineral activity on adjacent open lands affecting noise levels in the closed areas. This is because there would be more closed areas that are far

enough from fluid mineral-related noise sources such that noise from those sources would be imperceptible to humans.

On the 52 percent (1,037,500 acres) of the BLM mineral decision area managed as NSO, there would be no noise from fluid mineral well pad construction, well drilling, operation or maintenance. Noise from fluid mineral activity on adjacent areas would contribute to noise levels in areas managed as NSO. Compared with the BLM No Action Alternative, managing a larger portion of the decision area as NSO would result in fewer instances of noise impacts from fluid mineral activity on adjacent open lands affecting noise levels in the NSO areas. This is because there would be more NSO areas that are far enough from fluid mineral-related noise sources such that noise from those sources would be imperceptible to humans.

Under BLM Alternative A, areas open to leasing with CSU stipulations (702,700 acres; 35 percent of the BLM mineral decision area) would experience noise from fluid mineral drilling and construction. Collocating fluid mineral infrastructure would minimize the intensity of noise impacts on sensitive receptors (**Appendix D**); however, intensifying operations at existing locations could increase the level and duration of noise from those well sites, resulting in more frequent, higher intensity impacts on receptors near existing infrastructure. These activities would result in short- and long-term impacts on sensitive noise receptors.

Certain areas open to leasing with TLs (317,400 acres; 16 percent of the BLM mineral decision area) would experience reduced noise levels from fluid mineral activity. Reduced noise levels would be the result of seasonal restrictions on construction and drilling in important wildlife areas, which would generally apply from November 1 through June 15. In areas managed with TLs not already covered by an NSO or CSU stipulation (**Appendix D**), the maintenance and operation of wells, access roads, and pipelines would contribute to year-round noise levels, including at sensitive receptor locations.

BLM Alternative B

Lands with Wilderness Characteristics

Under BLM Alternative A, the BLM would manage 24,300 acres of lands managed to protect wilderness characteristics as a priority over other multiple uses. Additionally, mechanical or surface disturbing vegetation treatments would not be allowed within the lands managed to protect with wilderness characteristics. Management of the 24,300 acres within Units 069, 075 and 082 would reduce impacts associated with noise created through development. Reducing the potential for noise within these areas may have beneficial impacts for sensitive receptors within the boundaries of the units.

Fluid Minerals

BLM Sub-Alternative B1

Under BLM Sub-Alternative B1, there would be 726,500 acres (37 percent of the BLM mineral decision area) closed to fluid mineral leasing and exploration. An additional 588,900 acres (30 percent of the BLM mineral decision area) would be managed as open to leasing subject to NSO stipulations. There would be no noise-related impacts from fluid mineral activity in these areas; however, noise from fluid mineral activity on adjacent open areas would still contribute to noise levels in closed and NSO areas. These impacts would be less than those under the BLM No Action Alternative, particularly for closed and NSO areas that are farthest from the closure or NSO boundary.

The nature and types of noise-related impacts in areas with standard terms and conditions (188,500 acres; 10 percent of the BLM mineral decision area) would be the same as those described under the BLM No Action Alternative.

Areas open to leasing with CSU stipulations (893,300 acres; 45 percent of the BLM mineral decision area) would experience fewer noise-related impacts from fluid mineral activities. In areas managed as open with CSU stipulations, there would be the potential for noise-related impacts on sensitive receptors from the construction of well pads, well drilling, and vehicle traffic on access roads.

In areas open to leasing, but with TLs (129,900 acres; 7 percent of the BLM mineral decision area), noise levels from fluid mineral activity would be less during certain seasons and in certain locations. For example, from April through October, TL stipulations on fluid mineral well construction and drilling would prevent noise impacts from those activities on sensitive cultural and recreational receptors in the vicinity of the entrance road to CCNHP. Seasonal restrictions on construction and drilling in important wildlife areas would reduce noise impacts on sensitive receptors, generally from November 1 through June 15 (**Appendix D**).

BLM Sub-Alternative B2

Under BLM Sub-Alternative B2, there would be 825,700 acres (42 percent of the BLM mineral decision area) closed to fluid mineral leasing and exploration. An additional 548,000 acres (28 percent of the BLM mineral decision area) would be managed as open to leasing subject to NSO stipulations. There would be no noise-related impacts from fluid mineral activity in these areas; however, noise from fluid mineral activity on adjacent open areas would still contribute to noise levels in closed and NSO areas. These impacts would be less than those under the BLM No Action Alternative, particularly for closed and NSO areas that are farthest from the closure or NSO boundary.

The nature and types of noise-related impacts in areas with standard terms and conditions (185,600 acres; 9 percent of the BLM mineral decision area) would be the same as those described under the BLM No Action Alternative.

Areas open to leasing with CSU stipulations (826,100 acres; 42 percent of the BLM mineral decision area) would experience fewer noise-related impacts from fluid mineral activities. In areas managed as open with CSU stipulations, there would be the potential for noise-related impacts on sensitive receptors from the construction of well pads, well drilling, and vehicle traffic on access roads.

In areas open to leasing, but with TLs (123,300 acres; 6 percent of the BLM mineral decision area), noise levels from fluid mineral activity would be less during certain seasons and in certain locations. For example, from April through October, TL stipulations on fluid mineral well construction and drilling would prevent noise impacts from those activities on sensitive cultural and recreational receptors in the vicinity of the entrance road to CCNHP. Seasonal restrictions on construction and drilling in important wildlife areas would reduce noise impacts on sensitive receptors, generally from November 1 through June 15 (**Appendix D**).

BLM Alternative C (Includes Sub-Alternatives C1, C2, C3, C4, C5, and C6; applying only to Fluid Minerals)

Lands with Wilderness Characteristics

Under BLM Alternative C, lands managed to protect wilderness characteristics would not be managed as a priority over other multiple uses. Sensitive receptors in these areas may be directly or indirectly impacted by noise created by development activities.

Fluid Minerals

BLM Sub-Alternatives C1–C6

Under Alternative C and Sub-Alternatives C1 through C5, there would be 109,100 acres (5 percent of the BLM mineral decision area) closed to fluid mineral leasing; there would be an additional 3 percent (153,800 acres) of the BLM mineral decision area closed to fluid mineral leasing under Alternative C6. There would be no noise-related impacts from fluid mineral activity in these areas; however, noise from fluid mineral activity on adjacent open areas would still contribute to noise levels in closed areas. Noise impacts for Alternatives C1 through C5 would be the same as the BLM No Action Alternative. Under Alternative C6, closing 44,700 (8 percent) more acres to fluid mineral leasing compared with the BLM No Action Alternative would reduce the potential for noise impacts from fluid mineral activity.

The nature and types of noise-related impacts in leased areas with standard terms and conditions would be the same as those described under the BLM No Action Alternative. Noise related impacts would be greatest

in areas with at least moderate development potential. Under Alternatives C1 to C6, acres of leased areas with moderate or high development potential would be 231,400, 229,900, 224,100, 208,000, 226,500, and 224,300 acres, respectively.

Areas open to leasing with CSU stipulations (see **Table 3-37** through **Table 3-41** in **Section 3.5.2, Minerals**) would experience noise from fluid mineral drilling and construction. However, noise levels from well operations and maintenance would vary by location, type of equipment, and topographic conditions (**Appendix D**).

In areas open to leasing, but with TLs (see **Table 3-37** through **Table 3-41** in **Section 3.5.2, Minerals**), noise impacts from the construction and operation of fluid mineral infrastructure would be the same as described under BLM Alternative A.

Compared with the BLM No Action Alternative, larger areas managed as open to leasing subject to NSO stipulations would result in fewer wells and slightly less potential for noise related impacts on sensitive receptors in the planning area. Under Alternative C1, 29,800 more acres subject to NSO stipulations would result in approximately 115 fewer wells compared with the baseline RFD. Under Alternatives C2–C6, there would be 118, 121, 124, 132, and 121 fewer wells, respectively, compared with the baseline RFD under the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). However, even with fewer wells, there would be noise from between 3,068 to 3,085 wells. Any noticeable difference in noise levels resulting from fewer overall wells would depend on well locations, type of equipment, and topographic conditions surrounding the wells.

BLM Alternative D

Lands with Wilderness Characteristics

Under BLM Alternative D, lands managed to protect wilderness characteristics would not be managed as a priority over other multiple uses. Sensitive receptors in these areas may be directly or indirectly impacted by noise created by development activities.

Fluid Minerals

There would be 109,100 acres (approximately 5 percent of the BLM mineral decision area) closed to fluid mineral leasing and 41,300 acres (2 percent of the BLM mineral decision area) open to leasing, subject to NSO stipulations. In these areas, there would be no noise-related impacts from fluid mineral activity. Fluid mineral activity on adjacent open areas would still contribute to noise levels in closed and NSO areas, resulting in the same impacts as the BLM No Action Alternative in closed areas and more impacts in NSO areas. Compared with the BLM No Action Alternative, there would be 42,500 fewer acres of NSO, which would result in a higher potential for noise impacts in those areas.

Impacts in areas with standard terms and conditions (769,200 acres; 39 percent of the BLM mineral decision area) would be the same as those described under the BLM No Action Alternative.

Areas open to leasing with CSU stipulations (1,093,300 acres; 55 percent of the BLM mineral decision area) would experience noise from fluid mineral drilling and construction; however, in certain areas there would be less noise from well operations and maintenance.

Stipulations on construction and operation of fluid mineral infrastructure in areas open to leasing with TLs (3,700 acres; less than 1 percent of the BLM mineral decision area) would seasonally reduce noise levels and associated impacts near bald and golden eagle nest sites and pinyon jay colonial nest sites. In most areas, stipulations would reduce noise levels from January 1 through July 30. In bald eagle winter areas, stipulations would reduce noise levels from November 1 to March 31 (**Appendix D**). Noise levels from the operation and maintenance of fluid mineral infrastructure would be the same as in areas open to leasing with standard terms and conditions.

BIA Alternatives

BIA No Action Alternative

Under a continuation of current management, there would be no specific noise-related stipulations. Prohibiting fluid mineral wells within 500 feet of any house or structure would reduce noise levels and associated impacts on residences and other sensitive receptors associated with those structures. In these areas, noise from well pad construction, drilling, operation, and maintenance would still be evident. The intensity and duration of the impact on sensitive noise receptors would depend on the nature and type of the noise source. Noise-related impacts from fluid mineral activity would typically be greater at night when ambient noise levels are lower.

BIA Alternative A

A fluid mineral stipulation under BIA Alternative A that would limit noise levels to 48.6 dBA at golden eagle and ferruginous hawk nest sites would result in negligible noise impacts on most sensitive noise receptors (**Appendix E**). This is because 48.6 dBA is roughly equivalent to ambient noise levels in populated areas. In these areas, during the daytime, it would be difficult for the human ear to distinguish between typical ambient noises and noise from fluid mineral activity.

Noise from oil and gas operations could be audible at sensitive noise receptor locations during nighttime. For remote receptors, such as campsites, wilderness boundaries, and cultural areas, where ambient noise levels are typically below 40 dBA, fluid mineral activity at 48.6 dBA would be noticeable above ambient noise levels. Increased noise levels could affect the setting and values of those resources.

Prohibiting fluid mineral wells within 1,320 feet (0.25 miles) of any residential or community structures would reduce noise impacts in those areas. Although noise from well pad construction, drilling, operation, and maintenance could still be evident, especially at night when ambient noise levels are lower, sustained impacts on sensitive noise receptors would be less than the BIA No Action Alternative. Brief, high intensity noise at well pads would be observable and could result in infrequent, short-term impacts on sensitive noise receptors. The magnitude and duration of the impact would depend on the nature and type of the noise event.

BIA Alternative B

Impacts from a 1,320-foot (0.25-mile) restriction zone around homes, schools, medical facilities and other structures would be the same as BIA Alternative A.

A fluid mineral stipulation that would limit nighttime noise levels to 35 dBA at the boundary of CCNHP (**Appendix E**) would result in negligible nighttime noise impacts on sensitive noise receptors in those areas. This is because 35 dBA is likely at or below ambient noise levels in CCNHP and other areas. At such a low dBA level, it would be difficult for the human ear to distinguish between typical ambient noises and noise from fluid mineral activity.

BIA Alternative C

A fluid mineral stipulation that would limit nighttime noise levels to 35 dBA at sensitive receptor locations such as homes, schools, churches, medical facilities, and sacred sites would result in negligible nighttime noise impacts on those receptors. This is because 35 dBA is likely at or below ambient noise levels, especially in populated areas. A stipulation that would prohibit fluid mineral wells within 1,320 feet (0.25 miles) of those receptors would further reduce the potential for nighttime impacts, as described under BIA Alternative A.

BIA Alternative D

Impacts would be the same as those described under the BIA No Action Alternative.

Cumulative Impacts

Cumulative impacts on sensitive noise receptors would be the result of past, present, and reasonably foreseeable future actions that contribute to noise levels at receptor locations. Under all alternatives, there

would be increased noise levels near oil and gas wells and access roads. New well pad construction, drilling, and constructing or expanding access road and pipeline infrastructure would result in short-term, high intensity noise impacts at receptor locations next to the construction. Combined with existing oil and gas activity, constructing new oil and gas infrastructure would raise the ambient noise levels near construction. As new wells become active, well operations and maintenance would contribute ongoing and sustained noise. Impacts would be highest during the nighttime when the ambient noise levels are lower.

Over time, the construction, operation, and maintenance of an expanded network of oil and gas wells, roads, and pipelines would incrementally increase noise levels, cumulatively increasing them at more sensitive noise receptor locations.

In the BLM mineral decision area, these impacts would be greatest under the BLM No Action Alternative and BLM Alternative D. This is because those alternatives would manage the most acres as open to leasing with standard terms and conditions. BLM Alternatives A and B would manage comparatively fewer areas as open to leasing and would include lease stipulations that would limit noise levels during the construction and operation of oil and gas wells. BLM Alternative C would include similar stipulations as the BLM No Action Alternative and Alternative D but would manage more acres with leasing stipulations.

In the BIA surface decision area, cumulative impacts would be similar to those described for the BLM, with the exception that stipulations to limit oil and gas development around buildings and cultural areas would limit noise impacts on those receptors. These protections would result in the fewest noise-related impacts under BIA Alternatives A, B, and C. The BIA No Action Alternative and Alternative D would include some stipulations to preclude oil and gas infrastructure near certain types of sensitive receptors, but those distances could result in oil and gas infrastructure outside the restriction area, cumulatively increasing the ambient noise levels at receptor locations.

3.4.13 Lands with Wilderness Characteristics

Affected Environment

Lands with wilderness characteristics apply only to BLM-managed lands; this is because the Navajo Nation and BIA have no comparable direction. See **Section 3.4.8**, Special Status and Listed Species, for a discussion of impacts on Navajo Nation sensitive areas.

Current Conditions

Section 603 of FLPMA directed the BLM to inventory all public lands under its jurisdiction for the presence of wilderness characteristics, as specified in Section 2(c) of the 1964 Wilderness Act (16 USC 1131). This one-time process led to the identification of Wilderness Study Areas (WSAs) that are under nondiscretionary protective management until Congress designates them as wilderness or releases them for other uses. Although the BLM no longer has the authority to establish WSAs, it has the authority and obligation to maintain an inventory of all resource values, including wilderness characteristics under Section 201 of FLPMA and to consider managing and protecting these resources through the RMP process under Section 202 of FLPMA.

In 1979, the BLM completed a wilderness inventory of New Mexico, including the decision area. The current inventory is the first major update since the original inventory was completed. Through the RMP process, various alternatives are considered to protect all or portions of the units containing wilderness characteristics, or to manage them for other uses and resource values.

BLM Manual 6310, Conducting Wilderness Characteristics Inventory on BLM Lands (BLM 2012a), provides policy and guidance for conducting wilderness characteristic inventories under Section 201 of FLPMA for areas not already designated as wilderness or WSAs. Greater detail on this process is provided in the Affected Environment Supplemental Report, Section AE.2.13, Lands with Wilderness Characteristics.

Previous planning documents in the FFO did not provide management decisions for lands with wilderness characteristics outside existing WSAs. This is because no new areas containing lands with wilderness characteristics were identified during project evaluations. The BLM began updating the inventory of lands with wilderness characteristics throughout the FFO, in conjunction with this plan amendment. As part of the update, the BLM reviewed proposals for lands with wilderness characteristics submitted by the New Mexico Wilderness Alliance.

In the inventory update, described in greater detail in the Affected Environment Supplemental Report, Section AE.2.13, Lands with Wilderness Characteristics, the BLM identified 24,300 acres that meet the inventory criteria as having wilderness characteristics spread across Unit 069, Unit 075, and Unit 082 (see **Figure 3-19**, BLM Units Inventoried for Wilderness Characteristics).

Through the March 2019 John D. Dingell Jr. Conservation, Management and Recreation Act (PL-116-9 Sec. 1121. San Juan County Settlement Implementation), the size of the Bisti/De-Na-Zin Wilderness Area increased by 2,250 acres and the Ah-shi-sle-pah Wilderness Study Area was converted to a Wilderness Area in addition to increasing the size to 7,242 acres. This change covered Unit 076, which had previously been identified as having wilderness characteristics in the original inventory.

Trends

Current trends in areas with wilderness characteristics indicate an overall decreasing quality of naturalness and opportunities for solitude and primitive, unconfined recreation. An increasing amount of oil and gas developments, agricultural infrastructure, recreation developments, routes and ROWs, and visitation may influence wilderness characteristics in the planning area over time. In particular, there is increasing regional interest for recreation in areas with wilderness characteristics.

Recreationists are expected to continue using areas with wilderness characteristics because of such values as primitive and unconfined recreation opportunities and outstanding opportunities for solitude.

Environmental Consequences

Lands with wilderness characteristics are parcels that meet a size requirement of 5,000 roadless acres (or exception criteria) and contain the characteristics of naturalness and either outstanding opportunities for solitude or primitive and unconfined recreation. In addition, they also may possess supplemental values, such as ecological, geological, or other features of scientific, educational, scenic, or historic value.

BLM Alternatives

Impacts Common to All BLM Alternatives

The acres of lands with wilderness characteristics that overlap key allocations that could either enhance or diminish wilderness characteristics, regardless of whether they would be managed for their protection, are displayed in **Table 3-34**. Existing grazing allotments would remain in place within 22,600 acres that overlap lands identified as having wilderness characteristics.

BLM No Action Alternative

The BLM would not manage any lands to protect their wilderness characteristics as a priority over other multiple uses. Not managing for the protection of the inventoried lands that were found to have wilderness characteristics would leave these lands vulnerable to surface-disturbing activities, which would diminish wilderness characteristics over time. Management actions to protect other resources and SDAs would offer some protection of wilderness characteristics; however, surface-disturbing activities, such as fluid mineral development, could alter the natural setting and reduce opportunities for solitude or primitive recreation for all lands with wilderness characteristics.

**Table 3-34
Acreage Impacts on Lands with Wilderness Characteristics¹**

Management Action	No Action Alternative <i>(Not Managed to Protect Wilderness Characteristics)</i>	Alt. A <i>(Managed to Protect Wilderness Characteristics)</i>	Alt. B1 <i>(Managed to Protect Wilderness Characteristics)</i>	Sub-Alt. B2 <i>(Managed to Protect Wilderness Characteristics)</i>	Alt. C <i>(Not Managed to Protect Wilderness Characteristics)</i>	Sub-Alt. C1 <i>(Not Managed to Protect Wilderness Characteristics)</i>	Sub-Alt. C2 <i>(Not Managed to Protect Wilderness Characteristics)</i>	Sub-Alt. C3 <i>(Not Managed to Protect Wilderness Characteristics)</i>	Sub-Alt. C4 <i>(Not Managed to Protect Wilderness Characteristics)</i>	Sub-Alt. C5 <i>(Not Managed to Protect Wilderness Characteristics)</i>	Sub-Alt. C6 <i>(Not Managed to Protect Wilderness Characteristics)</i>	Alt. D <i>(Not Managed to Protect Wilderness Characteristics)</i>
Total Acres Managed to Protect Wilderness Characteristics	0	24,300	24,300	24,300	0	0	0	0	0	0	0	0
ROW avoidance	0	0	956,100	956,100	10,400	0	0	0	0	0	0	10,400
ROW exclusion	0	24,200	24,200	24,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800
Grazing allotments	22,600	22,600	22,600	22,600	22,600	22,600	22,600	22,600	22,600	22,600	22,600	22,600
Closed to fluid mineral leasing	10,600	22,000 ²	22,000 ²	22,000	10,600	10,600	10,600	10,600	10,600	10,600	10,600	10,600
NSO	0	0	0	0	0	0	0	0	0	0	0	0
CSU	7,100	0	0	0	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900
TL	1,800	0	0	0	1,800	1,800	1,800	1,800	1,800	1,800	1,800	0
Standard stipulations	4,300	0	0	0	4,300	4,300	4,300	4,300	4,100	1,400	4,300	4,500
Existing coal lease	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000
ACEC	0	10,100	10,100	10,100	0	0	0	0	0	0	0	0
Wildlife Area and Research Natural Area	0	4,600	4,600	4,600	0	0	0	0	0	0	0	0

Source: BLM GIS 2019

¹ Acres refer to impacts on lands in the BLM's current inventory of lands with wilderness characteristics.

² Acreage does not exactly match total lands with wilderness characteristics because some portions of lands with wilderness characteristics have nonfederal mineral estate beneath them.

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Management under the BLM No Action Alternative has led to current conditions that include wilderness characteristics existing in three areas in the BLM-managed lands. Wilderness characteristics would likely persist in many of these areas under the BLM No Action Alternative, although wilderness characteristics in at least some areas that possess wilderness characteristics could degrade under this alternative.

BLM Alternative A

The BLM would manage all 3 units, totaling 24,300 acres (1.9 percent of the BLM surface decision area), to protect their wilderness characteristics as a priority over other multiple uses. This would retain their specific characteristics.

Unit 069

Vegetation Management

Under BLM Alternative A, mechanical or surface-disturbing vegetation treatments would not be allowed in Unit 069. Also, Unit 069 would be closed to wood product sales and/or gathering and cutting, including Christmas tree cutting. These actions would protect the wilderness characteristics of naturalness and solitude from unnatural manipulation of the environment or increased human presence or vehicle traffic.

Lands and Realty

Unit 069 would be managed as a ROW exclusion area. There would be no effects on the size of the area, naturalness, and primitive and unconfined recreation. Managing this unit as ROW exclusion would reduce impacts on apparent naturalness and opportunities for solitude and primitive recreation compared with the BLM No Action Alternative due to a reduction in surface-disturbing activities or development.

Fluid Minerals

Managing for the protection of lands with wilderness characteristics as a priority over other multiple uses under BLM Alternative A would include various restrictions on resource uses on 5,900 acres of BLM-managed surface lands in Unit 069. Under BLM Alternative A, Unit 069 would be recommended for withdrawal from locatable mineral entry, eliminated from future consideration for coal leasing, and closed to fluid mineral leasing. This management would protect the unit from impacts on the apparent naturalness and any outstanding opportunities for solitude and primitive and unconfined recreation from these activities. Development of existing leases, however, could still affect these qualities.

Unit 075

Managing for the protection of lands with wilderness characteristics as a priority over other multiple uses under BLM Alternative A would include various restrictions on resource uses on 8,300 acres of BLM-managed surface lands within Unit 075.

Vegetation Management

Under BLM Alternative A, mechanical or surface-disturbing vegetation treatments would not be allowed in Unit 075. Also, Unit 075 would be closed to wood product sales and/or gathering and cutting, including Christmas tree cutting. These actions would protect the wilderness characteristics of naturalness and solitude from unnatural manipulation of the environment, increased human presence, or vehicle traffic.

Lands and Realty

Unit 075 would be managed as a ROW exclusion area. There would be no effects on the size of the area, naturalness, and primitive and unconfined recreation. Managing this unit as ROW exclusion would reduce impacts on apparent naturalness and opportunities for solitude and primitive recreation compared with the BLM No Action Alternative due to a reduction in surface-disturbing activities or development.

Fluid Minerals

Under BLM Alternative A, Unit 075 would be recommended for withdrawal from locatable mineral entry, eliminated from consideration for coal leasing, closed to fluid mineral leasing, and closed to nonenergy solid mineral leasing. This management would prevent impacts on the apparent naturalness and any outstanding

opportunities for solitude and primitive and unconfined recreation. Development of existing leases, however, could still affect these qualities.

Unit 082

Managing for the protection of lands with wilderness characteristics as a priority over other multiple uses under BLM Alternative A would include various restrictions on resource uses on 10,100 acres within Unit 082.

Vegetation Management

Under BLM Alternative A, mechanical or surface-disturbing vegetation treatments would not be allowed in Unit 082. Also, Unit 082 would be closed to wood product sales and/or gathering and cutting, including Christmas tree cutting. These actions would protect the wilderness characteristics of naturalness and solitude from unnatural manipulation of the environment, increased human presence, or vehicle traffic.

Lands and Realty

Unit 082 would be managed as ROW exclusion areas for oil and gas ROWs. There would be no effects on the size of the areas, naturalness, and primitive and unconfined recreation. Managing these units as ROW exclusion would reduce impacts on apparent naturalness and opportunities for solitude and primitive recreation compared with the BLM No Action Alternative due to a reduction in surface-disturbing activities or development.

Fluid Minerals

Under BLM Alternative A, Unit 082 would be recommended for withdrawal from locatable mineral entry, eliminated from consideration for coal leasing, closed to fluid mineral leasing, and closed to nonenergy solid mineral leasing. This management would prevent impacts on the apparent naturalness and any outstanding opportunities for solitude and primitive and unconfined recreation. Development of existing leases, however, could still affect these qualities.

BLM Alternative B (Including Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

Under BLM Alternative B, the BLM would manage 3 units totaling 24,300 acres (1.9 percent of the BLM surface decision area) to protect their wilderness characteristics as a priority over other multiple uses. This would retain their specific characteristics.

Where wilderness characteristics are managed for protection, surface-disturbing activities would be minimized, such that the natural quality of the area is maintained, and opportunities for solitude and primitive recreation, where they occur in the areas, would be maintained.

Under BLM Alternative B, no mechanical or surface-disturbing vegetation treatments would be conducted in lands managed to protect wilderness characteristics as a priority over other multiple uses.

Unit 069

Manage Unit 069 to protect outstanding opportunities for solitude, primitive and unconfined recreation, and undisturbed landscapes compatible with zone objectives in the Farmington RMP (BLM 2003) and with special attention to protecting wildlife habitat and cultural resources.

Managing for the protection of lands with wilderness characteristics under BLM Alternative B would include various restrictions on resource uses on 5,900 acres of BLM-managed surface lands within Unit 069.

Management, and impacts of that management, in this unit would be similar to those under BLM Alternative A except that locatable mining claims could still occur under BLM Alternative B. Impacts on the apparent naturalness and any outstanding opportunities for solitude and primitive and unconfined recreation from surface-disturbing activities and human presence would be reduced compared with the BLM No Action Alternative.

Fluid Minerals

BLM Sub-Alternative B1 and B2

Under BLM Sub-Alternatives B1 and B2, fluid mineral development would not be allowed within 5,900 acres of BLM-managed surface lands within Unit 069.

Unit 075

Manage Unit 075 for the protection of outstanding opportunities for solitude and undisturbed landscapes. This unique roadless area has outstanding opportunities for solitude, given the unique topography and vegetation, which call for special attention to protect wildlife habitat and cultural resources.

Managing for the protection of lands with wilderness characteristics as a priority over other multiple uses under BLM Alternative B would include various restrictions on resource uses on 8,300 acres of BLM-managed lands within Unit 075. Management, and impacts of that management, in this unit would be similar to those under BLM Alternative A. Impacts on the apparent naturalness and any outstanding opportunities for solitude and primitive and unconfined recreation from surface-disturbing activities and human presence would be reduced compared with the BLM No Action Alternative.

Under Alternative B, Unit 075 would be managed as a ROW exclusion area.

Fluid Minerals

BLM Sub-Alternative B1 and B2

Under BLM Sub-Alternatives B1 and B2, fluid mineral development would not be allowed within 8,300 acres of BLM-managed surface lands within Unit 075.

Unit 082

Manage Unit 082 to protect outstanding opportunities for solitude and undisturbed landscapes, compatible with objectives in the 2003 RMP (BLM 2003) and this amendment and with special attention to protecting viewsheds, wildlife habitat, and cultural resources.

Managing for the protection of lands with wilderness characteristics under BLM Alternative B would include various restrictions on resource uses on 7,900 acres within Unit 082. Management, and impacts of that management, in this unit would be similar to those under BLM Alternative A. Impacts on the apparent naturalness and any outstanding opportunities for solitude and primitive and unconfined recreation from surface-disturbing activities and human presence would be reduced compared with the BLM No Action Alternative.

Fluid Minerals

BLM Sub-Alternative B1 and B2

Under BLM Sub-Alternatives B1 and B2, fluid mineral development would not be allowed within 7,900 acres of BLM-managed surface lands within Unit 082.

BLM Alternative C (Includes BLM Sub-Alternatives C1–C6; applying only to Fluid Minerals)

Under BLM Alternative C the BLM would not prioritize management of lands with wilderness characteristics over other resources; however, some lands with wilderness characteristics could receive indirect protection through ROW exclusion and avoidance, closures, standard stipulations, CSU, and TL stipulations.

BLM Alternative C would provide less protection to roadless areas, naturalness, and the outstanding opportunities for solitude from oil and gas development than the BLM No Action Alternative. Under Alternative C approximately 6,900 acres of inventoried units found to possess wilderness characteristics would be subject to CSU stipulations, approximately 1,800 acres would be subject to TL (**Table 3-34**). Additionally, 4,300 acres would be subject to standard stipulations.

The degree of impact on lands identified as possessing wilderness characteristics would depend on the type and intensity of development, but any surface-disturbing activities are expected to lower the apparent naturalness and any outstanding opportunities for solitude and primitive and unconfined recreation.

Vegetation Management

Under Alternative C, vegetation treatments may be conducted by BLM within lands identified as having wilderness characteristics.

Lands and Realty

Under BLM Alternative C, 2,800 acres of lands identified as possessing wilderness characteristics in Unit 075 would be managed as ROW exclusion, which would eliminate impacts from ROW development in these areas. Under Alternative C, no acres of lands identified as possessing wilderness characteristics would be managed as ROW avoidance. The remaining area in the lands with wilderness characteristics units could be subject to ROW location and its resulting impacts on apparent naturalness and outstanding opportunities for solitude and primitive and unconfined recreation.

Fluid Minerals

BLM Sub-Alternatives C1 to C6

Unit 069

Under BLM Sub-Alternatives C1 to C6, Unit 069 would not have any overlapping closures; therefore, the entire 5,900 acres would be available for fluid mineral leasing and development. Impacts would be the same as under the BLM No Action Alternative.

Unit 075

Under BLM Sub-Alternatives C1 to C6, Unit 075 would be subject to closures within 2,800 acres, leaving the remaining 5,500 open to fluid mineral development. Impacts would be the same as under the BLM No Action Alternative.

Unit 082

Under BLM Sub-Alternatives C1 to C6, Unit 082 would be subject to closures within the entire 7,800 acres; therefore, impacts would be the same as under the BLM No Action Alternative.

BLM Alternative D

As under BLM Alternative C, under BLM Alternative D, other uses would be emphasized as a priority over protecting wilderness characteristics; however, some lands with wilderness characteristics could receive indirect protection due to the management of other resources.

Under BLM Alternative D, 2,800 acres in Unit 075 would be managed as ROW exclusion, which would eliminate impacts from ROW development in these areas. No acres of lands identified as possessing wilderness characteristics would be managed as ROW avoidance. The remaining area in the lands with wilderness characteristics units could be subject to ROW location and its resulting impacts on apparent naturalness and outstanding opportunities for solitude and primitive and unconfined recreation. These impacts would be reduced compared with the BLM No Action Alternative.

BLM Alternative D would provide less protection to roadless areas, naturalness, and the outstanding opportunities for solitude from oil and gas development than the BLM No Action Alternative. Under Alternative D approximately 6,900 acres of inventoried units found to possess wilderness characteristics would be subject to CSU stipulations (**Table 3-34**). The degree of impact on lands identified as possessing wilderness characteristics would depend on the type and intensity of development, but any surface-disturbing activities are expected to lower the apparent naturalness and any outstanding opportunities for solitude and primitive and unconfined recreation.

Cumulative Impacts

The area used to analyze cumulative impacts on lands with wilderness characteristics is BLM-managed surface lands in the planning area. The identified lands with wilderness characteristics are present today due to past actions, both on BLM-managed land and land not administered by the BLM.

Development from fluid minerals or coal leasing projects are most likely to affect the indicators for lands with wilderness characteristics. This would be due to the surface disturbance and facility development associated with these resource uses; however, because of overlapping management for other resources such as SDAs, surface disturbance across portions of the units would be minimized.

Incremental effects would be dependent on the amount of mineral and ROW development on lands with wilderness characteristics. Overall effects would remain low mainly from avoidance and exclusion restrictions in areas that were inventoried for lands with wilderness characteristics. Areas to be managed to protect wilderness characteristics as a priority over other multiple uses under BLM Alternatives A and B would be on 24,300 acres within 3 units. Impacts affecting wilderness characteristics would occur most under the BLM No Action Alternative and BLM Alternatives C and D, as none of the inventoried units would be managed to protect wilderness characteristics as a priority over other multiple uses.

3.5 RESOURCE USES

3.5.1 Livestock Grazing

Affected Environment

Current Conditions

Current conditions for livestock grazing are described in detail in the Affected Environment Supplemental Report and the 2003 RMP (BLM 2003). To address complicated grazing administration issues in the area, the BLM, BIA, and Navajo Nation signed an MOU in 1965 for livestock grazing administration. The MOU was amended and extended in 2003 by all parties.

BLM

There are approximately 208 grazing allotments on the lands managed by the BLM in the planning area, with various assignments, including:

- 143 Section 3 allotments, of which:
 - 137 are not covered under the MOU and are managed exclusively by the BLM
 - Six were assigned to BLM FFO management, including three very large Navajo community allotments (Kimbeto, Largo, and Counselor Communities)
- 65 Section 15 allotments, of which:
 - 30 are covered under the MOU and were assigned administratively to the BIA Eastern Navajo Agency (ENA) and Navajo Nation
 - Five are not covered under the MOU and are managed under the Navajo Nation Tribal Ranches program

In addition to the 208 allotments, there are 21 allotments within or overlapping the FFO boundary that are managed by the BLM Rio Puerco Field Office through an interagency agreement.

There are approximately 311 authorizations on the 143 Section 3 allotments, of which Navajo community allotments represent a large portion, and 65 authorizations on the 65 Section 15 allotments. In addition, the 30 Section 15 authorizations issued to the Navajo Nation and administered by the BIA are leased out to approximately 277 individual Navajo operators.¹¹

¹¹ Effie Delmar, BIA, ENA Natural Resource Manager, email with Jeff Tafoya, BLM, Rangeland Management Specialist, on March 20, 2013.

There are approximately 119,162 animal unit months (AUMs) of grazing authorized by the FFO. Of those, 9,228 are Navajo free use. An additional 26,989 AUMs are currently in suspension. Grazing authorizations in the FFO primarily permit cattle and sheep grazing; a limited number permit some goats and occasionally horses for ranch use only. Allotments range in size from approximately 20 to over 100,000 acres. The grazing allotments in the planning area total over 3,120,900 acres, including approximately 1,394,800 acres on BLM-managed lands. Navajo free use grazing has occurred historically in the checkerboard area and continues to occur.

Grazing permits range from 1 sheep to over 300 cattle and over 3,500 sheep. Most allotments contain a combination of federal, state, and private land. Periods of livestock use vary by allotment, from year-round to seasonal. In addition to the authorized livestock grazing, the BLM is carrying forward management decisions from the 2003 RMP for wild and free roaming horses.

BIA

In addition to allotments on lands managed by the BLM and assigned administratively to the BIA ENA, Navajo Nation, or Navajo Nation Tribal Ranches program described above, District 13 of the Northern Navajo Agency extends into the planning area. In this district, the BIA manages 210 Navajo grazing permits on Tribal trust lands. These permits include 10,505 sheep units year-long (SUYL) permitted, roughly equivalent to 2,101 AUMs (BIA 2017). The Eastern Navajo Agency manages approximately 189,400 acres of permitted grazing in five districts on Navajo Tribal trust and individual Indian allotment lands in the planning area, supporting around 1,637 AUMs (BIA 2018).

The most recent range inventory to determine carrying capacity was done in 2014, which showed the area examined to be approximately seven times over-allocated for livestock, based on the available forage. Carrying capacities were adjusted to available forage, based on the 2007 and 2013 range inventories.

The Navajo Nation also has a Tribal Ranch Program that administers grazing on Tribal fee lands for individual Indian allottees. In total, 150,400 acres are included in the planning area under the Tribal Ranch Program, supporting grazing for 250 allottees and providing forage for approximately 1,065 AUMs.

Environmental Consequences

This section is a discussion of the impacts on range management from proposed management actions on other resources and resource uses. Impacts would be the same for BLM-managed leases and permits and for permits administered by the Navajo BIA and Navajo Tribal Ranch Program, except as noted.

BLM Alternatives

There are no BLM decisions being considered that would affect livestock grazing beyond the impacts analyzed in the 2003 RMP; therefore, impacts on livestock grazing from BLM alternatives are not discussed in the FMG RMPA/EIS. Vegetation management under all alternatives and FFO-VCCs would support livestock grazing.

BIA Alternatives

Impacts Common to All BIA Alternatives

Under all BIA alternatives, development activities would affect livestock and grazing resources through route construction and maintenance, well pad construction, vehicle traffic, potential hazardous materials, and noxious weed infestations. Additional surface disturbance from oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative.

Under all alternatives, the BIA and BLM may apply COAs (**Appendix C**) to oil and gas APDs in the BIA mineral decision area. This would promote rapid reclamation, maximize resource protection, and minimize soil erosion. When COAs are applied, impacts on grazing would be minimized, due to a reduction in disturbance to forage and livestock.

Under all BIA alternatives, Navajo grazing rights would be protected, and the Navajo Nation's rights respecting the use of water would be unimpaired. This would allow for continued use of water developments to maintain grazing operations.

Under all BIA alternatives, the agency would limit vehicular access for well sites to approved access roads and would apply setbacks from structures and water bodies. This would continue to limit surface disturbance associated with new roads and facilities and could limit the risk of impacts on range management.

BIA No Action Alternative

Under the BIA No Action Alternative, grazing would continue as an authorized use on Tribal trust lands and allotted lands. Fluid mineral leasing and development in the BIA mineral decision area would continue, with the potential for direct (e.g., livestock dispersal and trespass) and indirect (such as forage availability) impacts on livestock grazing operations.

BIA Alternative A

Under BIA Alternative A, any range improvements, such as livestock fences and ponds, disturbed by construction would be restored immediately following construction. They would be restored to the condition they were in before disturbance or better. There is no similar stipulation in current BIA management. Restoring range improvements would reduce impacts on range management from oil and gas development by providing additional grazing opportunities.

Under BIA Alternative A, lessees would not be permitted to use any waters of the Navajo Nation without a water use permit issued by its Water Code Administration; lessees could not drill any water wells without a drilling permit. This would reduce impacts on water availability for range improvements, compared with the BIA No Action Alternative. Additionally, lessees would be required to negotiate and compensate the landowners for all surface use, including grazing lands. This compensation would help offset costs to grazing lessees from impacts on range management.

Requiring interim reclamation and applying larger setbacks from structures and water bodies could contribute to reduced localized levels of surface disturbance projected under this alternative, compared with the BIA No Action Alternative. This would result in less potential for impacts on range management.

BIA Alternative B

Impacts would be similar to those described under BIA Alternative A. The difference is that requiring directional drilling and collocation of facilities could contribute to further reduced localized surface disturbance, compared with the BIA No Action Alternative. This would result in less potential for impacts on range management.

BIA Alternative C

Impacts would be the same as described under BIA Alternative B.

BIA Alternative D

Impacts would be similar to those described under BIA Alternative A. The exception is that setbacks from structures and water bodies would be the same as those under the BIA No Action Alternative. Overall, there is the same potential for impacts on range management from surface disturbance under BIA Alternative D as under the BIA No Action Alternative.

Cumulative Impacts

The cumulative impacts analysis area is the entire planning area, regardless of surface or mineral ownership. Livestock grazing has a long history in the region, although, generally, it has decreased over the past 100 years. Grazing in portions of the planning area has either remained stable or has declined since the late twentieth century.

Past actions that have affected livestock grazing are human-caused surface disturbances (mineral development, recreation, prescribed burning, and historical grazing practices) and wildland fires that have contributed to current ecological conditions.

Present actions affecting livestock grazing are mainly those that reduce available grazing acreage or the level of forage production in those areas. Key examples are wildland fires, mineral and energy development, habitat restoration, and SDAs that restrict grazing.

Future actions affecting livestock grazing are similar to the present actions, including any restriction associated with future species listings under the ESA and changes to forage due to drought or climate change.

Projects that increase human disturbance in grazing areas could also indirectly affect grazing by increasing weeds and invasive plants. These projects could also directly affect grazing by displacing, injuring, or killing animals. Cumulative impacts would be greater on livestock grazing if the projects were to occur simultaneously.

The contribution to cumulative impacts from proposed management under each BLM and BIA alternative would follow the impacts of the alternatives above. In general, management actions under every BLM and BIA alternative would result in short-term or long-term changes in availability of forage. These would primarily be due to vegetation treatment and surface-disturbing and disruptive activities associated with fluid mineral leasing and ROW authorizations.

No direct changes to the cumulative acres available to grazing or the level of permitted forage would occur as a result of proposed BLM or BIA management. BIA management under all alternatives would support continued availability of water to support livestock grazing.

3.5.2 Minerals

Affected Environment

Minerals managed by the BLM are classified into two categories: fluid minerals and solid minerals. Solid minerals are subdivided into locatable, leasable, and salable. Locatable minerals are valuable metallic or nonmetallic minerals, such as copper, gold, and uranium. (Solid minerals is not included as a stand-alone section because the scope of the FMG RMPA/EIS is such that no decisions are being made for solid minerals management.) There are no active locatable mineral mines in the BLM planning area. Future locatable mineral activity is not anticipated for the life of the RMPA; therefore, locatable minerals are not discussed further in this EIS.

In the planning area, the minerals most commonly found are as follows:

- Leasable—oil and gas (including coal bed methane) and coal
- Salable—sand, gravel, sandstone, fill dirt, and humate

Current Conditions

Fluid Minerals: Oil and Gas

Hydrocarbon production in the planning area is primarily from natural gas, coal bed methane, and oil/condensate, all in the San Juan Basin. Oil-producing intervals include the Jurassic San Rafael Group, including the Entrada Sandstone, and the Cretaceous Gallup Sandstone and Tostito Sandstone “lenticles” within the Mancos Shale. Gas is found in the Jurassic Burro Canyon Formation; the Cretaceous Mesaverde Group, Lewis Shale, Pictured Cliffs Sandstone, and Fruitland Formation; and the Tertiary Ojo Alamo Sandstone, Nacimiento Formation, Animas Formation, and San Jose Formation. Formations that are known to produce both oil and gas include the Jurassic Morrison Formation, including the Brushy Basin Member; the Cretaceous Dakota Sandstone; and members of the Mancos Shale, including the Graneros, Greenhorn Limestone, Juana Lopez, and El Vado Sandstone.

The 2019 RFD Scenario for Oil and Gas Activities for the FMG RMPA/EIS Planning Area (**Appendix I**) describes historical production amounts and oil and gas activity levels in the San Juan Basin and the planning area. In general, most of the natural gas produced in New Mexico is from the planning area. Statewide natural gas production in 2016 was 1,278 billion cubic feet.

San Juan County is the second-largest natural gas-producing county in the state, producing 249 billion cubic feet in 2016. Rio Arriba County is the fourth-largest producing county, with 196 billion cubic feet in 2015. These two counties combined produced 46 percent of the total natural gas in New Mexico in 2016 (New Mexico Energy, Minerals, and Natural Resources Department 2016, p. 15).

The planning area produces a smaller percentage of New Mexico's oil. Of a 2016 statewide total of 118 million barrels, San Juan and Rio Arriba Counties produced 2.4 and 1.3 million barrels, respectively. These two counties produced a combined total of 3 percent of statewide oil production in 2016 (New Mexico Energy, Minerals, and Natural Resources Department 2016, p. 15).

Changes Since 2003

In the 2001 RFD, the BLM noted that most existing Mancos Shale and Gallup Sandstone reservoirs were approaching depletion, producing fewer than 30 barrels of oil per month per well. As a result, these reservoirs were considered marginally economic, and the wells were candidates to be plugged and abandoned in the near future; however, high oil prices greater than \$100/barrel returned and persisted until late in 2014, so few marginal Gallup wells have been plugged and abandoned.

The 2001 RFD projected a minimal number of new completions in the Mancos/Gallup Formations; however, recent successes in the exploration and development for oil in US shale plays have resulted in a significant increase in domestic oil production. The Bakken in North Dakota, the Eagle Ford shale in Texas, and the Avalon/Bone Spring in southeast New Mexico are all examples of major shale plays contributing to the oil production increase. As a result, the Mancos/Gallup Formations have become major targets for future exploration and development.

Advances in technology have resulted in more industry interest in developing the formations using horizontal well development and stimulation techniques. These technological advances include improved reservoir characterization, leading to improvements in well placement and stimulation techniques.

According to the BLM, as of November 2017, there have been approximately 291 total horizontal wells drilled and completed in the Mancos/Gallup Formations. There were 498 federal and 108 BIA APDs for a total of 607 APDs between 2014 and 2017.¹² Coalbed methane production has decreased in share of gas production in the San Juan Basin from approximately 49.5 percent of gas production in 2006 to 41.0 percent in 2014 (Natural Gas Intel 2018).

Solid Minerals: Coal

The primary coal resources in the planning area are in the Fruitland and Menefee Formations.

Solid Minerals: Sand and Gravel

These make up most of the other minerals extracted in the planning area, though humate¹³ mining also exists in the planning area. The sand and gravel are mostly on mesa tops that consist of remnants of the Quaternary stream-cut terrace. The rock and stone materials are fragments of the weathered Ojo Alamo Sandstone and Farmington Sandstone Member. The humate in the planning area is a thermally immature coal from the Fruitland Coal Formation.

¹² Joe Hewitt, BLM FFO Geologist, comment to Francis Craig, EMPSi geological specialist, December 18, 2017.

¹³ A thermally immature form of coal formed from decomposed prehistoric plant and animal matter and commonly used as fertilizer.

BLM Mineral Decision Area

Fluid Minerals: Oil and Gas

Approximately 107,800 acres are closed to fluid mineral development; an additional 84,100 acres are open to fluid mineral leasing with NSO stipulations (BLM GIS 2017; see **Figures 2-9**, BLM No Action Alternative: Fluid Mineral Leasing, and **2-14**, BLM No Action Alternative: No Surface Occupancy for Fluid Mineral Leasing). Surface occupancy and surface-disturbing activities associated with fluid mineral leasing cannot be conducted on the surface of these lands.

CSU stipulations are applied to all leases issued on 1,113,300 acres (BLM GIS 2017; see **Figure 2-18**, BLM No Action Alternative: Controlled Surface Use for Fluid Mineral Leasing). These areas are open to fluid mineral leasing, but the stipulations allow the BLM to require special operational constraints.

TL stipulations are applied on 316,300 acres to protect big game winter range, bird of prey nests, elk calving areas, and other sensitive wildlife resources. The boundaries for each TL are determined either by SDA boundaries or site-specific surveys. These areas are open to fluid mineral leasing, but these stipulations allow the BLM to restrict development during certain times (BLM GIS 2017; see **Figure 2-23**, BLM No Action Alternative: Timing Limitations for Fluid Mineral Leasing).

The remaining 738,400 acres of the BLM mineral decision area are open to fluid mineral leasing subject to standard lease terms and conditions (BLM GIS 2017).

Significant leasing has taken place since the 2003 RMP (see **Figure 1-2**, Leased and Unleased Acreage in the BLM Mineral Decision Areas). Approximately 1.8 million acres are covered by 2,860 active leases. On BLM-managed minerals, 1.6 million acres (80 percent) are covered by 2,300 leases. This includes 190,000 acres of leases on BLM-managed minerals and Navajo Tribal trust surface. On BIA-managed minerals, 260,000 acres (44 percent) are covered by 560 leases (BLM GIS 2017; see **Figure 3-20**, Oil and Gas Leases). Most existing active leases have approved APDs (see **Figure 1-3**, Existing Oil and Gas Leases).

Solid Minerals: Coal

In the mineral decision area, there are a total of 44,500 acres of active coal leases, and there are 33,600 acres of active coal leases on Navajo Tribal trust Lands (see **Figure 3-21**, Coal). The San Juan underground coal mine is active in the northwest portion of the BLM mineral decision area and produces approximately 3.2 million tons annually. The surface operation of the San Juan coal mine is in reclamation. The La Plata coal mine was active in the BLM mineral decision area when the 2003 RMP was published, but the area has since been reclaimed. The surface Navajo Coal Mine is in the decision area, but it is on Tribal surface and Tribal minerals.

Salable Minerals: Sand and Gravel

There are 27 active permitted salable minerals operations in the BLM mineral decision area (see **Figure 3-22**, BLM Salable Minerals and BIA Nonenergy Solid Minerals). In addition, quarry locations of fewer than the 5 acres associated with oil and gas well sites are used to supply gravel or sandstone to surface access roads. In addition to the permitted operations, the FFO is permitting eight pending salable mineral operations.

BIA Mineral Decision Area

The BIA approves leases for fluid minerals (oil and gas), coal, and nonenergy solid minerals on Navajo Tribal trust minerals and individual Indian allotment minerals (**Section 1.1**, Introduction).

Fluid Minerals: Oil and Gas

There are 12 oil and gas leases on Navajo Tribal trust minerals in the BIA mineral decision area and 551 leases on individual Indian allotment minerals. These leases cover 260,000 acres (44 percent) of the BIA mineral decision area. The Navajo Nation has not issued a lease on Navajo Tribal trust minerals since 1975,

and they do not expect to issue any new leases on Tribal trust minerals in the planning area in the 20-year planning horizon.¹⁴

Solid Minerals: Coal

There are 33,600 acres of coal leases in the BIA mineral decision area. Navajo Mine is a surface coal mine on Navajo Tribal trust minerals that supplies the Four Corners Power Plant (see **Figure 3-21**, Coal). It is owned by the Navajo Nation and operated by Navajo Transitional Energy Company. In 2016, the mine produced 4.2 million tons of coal (Navajo-tec 2017).

Solid Minerals: Nonenergy Solid Minerals

Sand and gravel material is extracted for construction and road building projects. The BIA issues sand and gravel leases on Navajo Tribal trust and individual Indian allotment minerals.

Trends

Fluid Minerals: Oil and Gas

While the shale in the Mancos Formation is similar to other productive shale plays in the United States, specific characteristics of the Mancos shale, such as clay content and total organic content, suggest that it may be less productive than other more developed shale plays (Engler et al. 2015). Current oil exploration and development in the Mancos/Gallup Formations are being appraised for the most productive areas. Natural gas production is much more consistent at this time; however, the southern portion of the planning area, near Lybrook and Cuba, contains remote areas that lack infrastructure, such as water, oil, and gas pipelines; power lines; and resource, local, and collector roads. These facilities are necessary to develop the Mancos/Gallup Formations in that area.

Additionally, natural gas production from the Mancos Shale and Gallup Sandstone Formations is unlikely to increase until the price of natural gas rises. Based on the Energy Information Administration (EIA) reference case, gas prices are forecast to be \$4.38 per million BTUs in 2020 and \$5.23 per million BTUs in 2025.¹⁵ At a July 2014 presentation to the New Mexico Legislature - Legislative Finance Committee meeting, there was a proposed a breakeven price of \$4.25 per million BTUs for the San Juan Basin; this is very close to the 2020 value predicted by the EIA. As a result, gas development is not anticipated to increase in the Mancos Formation until 2020; however, once the economics become favorable, the activity is anticipated to rapidly increase (Engler et al. 2015, p. 21). The production of coal bed methane gas in the planning area is also price dependent and is expected to closely track the trends of Mancos/Gallup Formations gas production in the planning area.

Much of the current oil exploration is in this southern portion of the planning area. The lack of infrastructure will challenge oil and gas development in the short term and may limit the initial pace of new development in these formations. Exploratory units are generally poorly explored reservoirs where exceptions to normal spacing requirements are allowed for operators to have flexibility in locating wells in order to test the reservoir and maximize resource recovery. Exploratory units are being formed in this area, which should allow operators to realign the wellbores, thus drilling longer laterals in a perpendicular direction to the fracture gradient.

Checkerboard landownership¹⁶ in the area of the Mancos/Gallup Formations, particularly in individual Indian allotment lands, is creating further difficulties for adding infrastructure and facilitating development. This is because it is more difficult to permit a road or pipeline that crosses both federal and individual Indian allotment land than it is to permit one that crosses only BLM-managed land. Permission for the road or

¹⁴ Akhtar Zaman & Steven Prince, personal communication with William Penner, EMPSi Cultural Specialist and Robert Begay, BIA Cultural Specialist. October 15, 2018.

¹⁵ Annual average Henry Hub spot prices for natural gas in 2012 dollars

¹⁶ An area where adjacent parcels are owned by entities other than the federal government

pipeline must be granted by each party whose land would be crossed, and both BIA and BLM permits must be secured.

More information on the forecast for oil and gas activity in the planning area is available in the 2019 RFD (**Appendix I**); it identified areas with high, moderate, and low oil development potential in the Mancos/Gallup Formations (**Table 3-35** and **Figure 3-23**, Oil and Gas Development Potential 2018–2037). The 2019 RFD predicts 3,093 new wells to be developed in the planning area under current management. An estimated 2,220 of these wells are expected to be horizontal, while 873 would be vertical. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells in the planning area is 271 million barrels of oil and 5.0 billion thousand cubic feet (mcf) of gas.

Table 3-35
Oil and Gas Development Potential, 2019–2037

Potential	BLM-managed Fluid Minerals	Unleased BLM-managed Fluid Minerals	BIA-managed Fluid Minerals	Unleased BIA-managed Fluid Minerals	Planning Area Total
High	190,600	13,900	48,400	3,000	273,400
Medium	1,096,300	132,000	72,300	41,500	1,635,000
Low	584,100	152,600	415,700	230,600	1,810,000
Negligible	62,300	61,900	54,000	54,000	249,400

Sources: **Appendix I**; BLM GIS 2017

Note: Acres do not total to the planning area or any decision area because nondiscretionary closures were not included.

Solid Minerals: Coal

San Juan Coal Mine, operated by Westmoreland Coal Company, has a contract to supply the San Juan Generating Station coal-fired power plant with coal from mine. Westmoreland is expected to reduce production from the mine by approximately 50 percent, to 3.5 million tons per year; therefore, no additional coal leases are expected to be issued for the San Juan Coal Mine over the life of the FFO RMP.

Navajo Mine, operated by Bisti Fuels Company LLC, is projected to produce approximately 5.9 million tons of coal per year (North American Coal 2016). A coal sale agreement with the Four Corners Power Plant ensures that the mine will stay operational through 2031 (Navajo-tec 2017).

No additional coal mines are expected to open in the planning area over the life of the RMP.

Solid Minerals: Nonenergy Solid Minerals

As demonstrated by continuing permit applications on federal minerals in the planning area, extraction of sand, gravel, and other minerals is likely to continue close to current levels. Future demand will vary, depending on market conditions for these minerals, which differ according to economic conditions and construction activity. Construction projects may lead to development of the sand and gravel and other mineral deposits within approximately 50 miles.

One driver of construction in the planning area is roads for oil and gas development. As new oil and gas development in the Mancos/Gallup Formations continues, sand, gravel, and other mineral activity is expected to continue at roughly the same level; however, the lack of roads in the vicinity of the Mancos/Gallup Formations may increase sand, gravel, and other mineral development in that area as oil and gas continue to be developed, and associated access roads are constructed.

Environmental Consequences

This section presents potential impacts on leasable, locatable, and salable mineral (mineral materials) resources from management actions for other resource and resource use programs. These impacts may be direct or indirect. For example, a direct impact on minerals and energy resources would result from

managing an area as closed to fluid mineral leasing or salable mineral sale, exchange, or conveyance. Where information is available, consideration is given to the development potential for minerals and energy resources in the areas withdrawn, closed, or restricted. An indirect impact is one that would change the economic feasibility of developing a site, for example restricting road construction.

BLM Alternatives

Impacts Common to All BLM Alternatives

Under all BLM alternatives, the drilling of new oil and gas wells could affect access to non-fluid mineral resources. Similarly, existing mining operations could interfere with access to oil and gas resources; however, directional drilling could be used to access resources in these areas. Under all alternatives, increased demand for sand and gravel for road and well pad construction is expected to result in the opening of new mineral material pits and the expansion of existing pits.

Closures and NSO stipulations applied to fluid mineral leases would have the greatest impact in high- and moderate-potential areas, as these are the areas that are most likely to be developed in the absence of management constraints. These management actions would have the greatest impact in unleased portions of high- and moderate-potential areas, as the closures and NSO stipulations would not apply to existing leases. In unleased areas subject to NSO stipulations, impacts could be mitigated where the fluid minerals underlying these areas could be extracted (or drained) via wells drilled nearby without having to drill into the actual area subject to the NSO stipulation. This could be accomplished if the parcel subject to NSO stipulations were part of a unit or communization agreement, if favorable landownership patterns and geology exist. Circumstances where this method of exploration and development is possible may be limited due to technological limitations on the distance that horizontal or directional well laterals can reach.

BLM No Action Alternative

Table 3-36 shows the management that would continue to apply to fluid minerals by development potential under this alternative. Under the BLM No Action Alternative, approximately 61 percent of unleased high-potential acres in the BLM mineral decision area would remain open to leasing subject to CSU stipulations, and 38 percent would be open to leasing subject to standard terms and conditions. No unleased high-potential areas would be closed, and only 1 percent would be subject to NSO stipulations. Additionally, 50 percent of unleased moderate-potential areas would remain open to leasing subject to CSU stipulations, and 42 percent would be open to leasing subject to standard terms and conditions. Approximately 11 percent of unleased moderate-potential areas would remain closed or subject to NSO stipulations. These closures and stipulations would continue to limit fluid mineral development. The 2019 RFD projects that up to approximately 1,873 new wells would be drilled on federal mineral estate over the next 20 years under this alternative. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells on federal mineral estate is 179 million barrels of oil and 2.9 billion mcf of gas. (**Appendix I**).

**Table 3-36
Fluid Mineral Leasing, BLM No Action Alternative**

Lease	High Potential (acres)	High Potential Unleased (acres)	Moderate Potential (acres)	Moderate Potential Unleased (acres)	Low Potential (acres)	Negligible Potential (acres)
Closed	100	0	33,800	10,400	25,300	800
Open (standard conditions)	44,100	5,300	276,300	276,100	373,000	61,400
TL ¹	16,300	300	278,200	19,800	21,700	0
CSU ¹	145,200	8,500	775,200	65,500	175,000	17,100
NSO ¹	4,000	200	57,700	4,900	21,500	600

Source: BLM GIS 2019

¹ Stipulation acreages may overlap; therefore, they cannot be summed to equal the total acreage with a given potential.

Because ROW authorizations would continue to be made on a case-by-case basis under this alternative, there would be no impacts from planning-level ROW decisions on mineral development in the BLM decision area.

BLM Alternative A

Table 3-37 shows the management that would apply to fluid minerals by development potential under this alternative. Under BLM Alternative A, approximately 6 percent of the unleased high-potential acres in the BLM mineral decision area would be closed to leasing, and another 57 percent would be subject to NSO stipulations. This is compared with a total of 1 percent of unleased high-potential acres closed or subject to NSO stipulations under the BLM No Action Alternative. Approximately 38 percent of unleased moderate-potential acres would be closed, with another 50 percent subject to NSO stipulations. The limitations on fluid mineral development resulting from these closures and stipulations would increase compared with the BLM No Action Alternative. The 2019 RFD projects that up to approximately 1,399 new wells would be drilled on federal mineral estate over the next 20 years under this alternative, a 25 percent decrease compared with the BLM No Action Alternative. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells on federal mineral estate is 143 million barrels of oil (a 21 percent decrease from the BLM No Action Alternative) and 2.4 billion mcf of gas (an 18 percent decrease from the BLM No Action Alternative; **Appendix I**).

**Table 3-37
Fluid Mineral Leasing, BLM Alternative A**

Lease	High Potential (acres)	High Potential Unleased (acres)	Moderate Potential (acres)	Moderate Potential Unleased (acres)	Low Potential (acres)	Negligible Potential (acres)
Closed	30,100	900	354,000	50,100	92,700	18,200
Open (standard conditions)	11,200	1,800	73,400	11,100	144,800	11,600
TL ¹	93,300	3,200	209,200	8,900	14,900	0
CSU ¹	119,000	7,400	448,800	29,500	127,000	7,900
NSO ¹	107,500	7,900	591,000	66,300	307,000	32,200

Source: BLM GIS 2019

¹ Stipulation acreages may overlap; therefore, they cannot be summed to equal the total acreage with a given potential.

Managing 28,800 acres of BLM surface land as ROW exclusion and 1,060,400 acres as ROW avoidance would limit the ability to access fluid mineral and other mineral development sites. Impacts would increase compared with the BLM No Action Alternative, which would not place any restrictions on ROW authorization.

BLM Alternative B (Includes BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

Managing 24,800 acres of BLM surface land as ROW exclusion and 956,100 acres as ROW avoidance would limit the ability to access fluid mineral and other mineral development sites. Impacts would increase compared with the BLM No Action Alternative, which would not place any restrictions on ROW authorization.

Fluid Minerals

BLM Sub-Alternative B1

Table 3-38 shows the management that would apply to fluid minerals by development potential under this alternative. Under BLM Sub-Alternative B1, approximately 23 percent of the unleased high-potential acres in the BLM mineral decision area would be closed to leasing, and another 31 percent would be subject to NSO stipulations. This is compared with a total of 1 percent of unleased high-potential acres subject to NSO

Table 3-38
Fluid Mineral Leasing, BLM Sub-Alternative B1

Lease	High Potential (acres)	High Potential Unleased (acres)	Moderate Potential (acres)	Moderate Potential Unleased (acres)	Low Potential (acres)	Negligible Potential (acres)
Closed	29,100	3,300	482,400	82,900	111,700	54,700
Open (standard conditions)	6,300	800	47,000	4,700	134,500	900
TL ¹	23,500	500	90,100	3,500	16,300	-
CSU ¹	140,400	8,400	492,200	33,800	255,800	4,900
NSO ¹	73,900	4,300	347,600	28,700	162,900	4,400

Source: BLM GIS 2019

¹ Stipulation acreages may overlap; therefore, they cannot be summed to equal the total acreage with a given potential.

stipulations with no closures under the BLM No Action Alternative. Approximately 63 percent of unleased moderate-potential acres would be closed, with another 22 percent subject to NSO stipulations. The limitations on fluid mineral development resulting from these closures and stipulations would increase compared with the BLM No Action Alternative. The 2019 RFD projects that up to approximately 1,402 new wells would be drilled on federal mineral estate over the next 20 years under this alternative, a 25 percent decrease compared with the BLM No Action Alternative. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells on federal mineral estate is 140 million barrels of oil (a 22 percent decrease from the BLM No Action Alternative) and 2.5 billion mcf of gas (a 17 percent decrease from the BLM No Action Alternative; **Appendix I**).

BLM Sub-Alternative B2

Table 3-39 shows the management that would apply to fluid minerals by development potential under this alternative. Under BLM Sub-Alternative B2, approximately 40 percent of the unleased high-potential acres in the BLM mineral decision area would be closed to leasing, and another 22 percent would be subject to NSO stipulations. This is compared with a total of 1 percent of unleased high-potential acres subject to NSO stipulations and no closures under the BLM No Action Alternative. Approximately 65 percent of unleased moderate-potential acres would be closed, with another 20 percent subject to NSO stipulations. The limitations on fluid mineral development resulting from these closures and stipulations would increase compared with the BLM No Action Alternative. The 2019 RFD projects that up to approximately 1,125 new wells would be drilled on federal mineral estate over the next 20 years under this alternative, a 40 percent decrease compared with the BLM No Action Alternative. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells on federal mineral estate is 113 million barrels of oil (a 37 percent decrease from the BLM No Action Alternative) and 2.2 billion mcf of gas (a 25 percent decrease from the BLM No Action Alternative; **Appendix I**).

Table 3-39
Fluid Mineral Leasing, BLM Sub-Alternative B2

Lease	High Potential (acres)	High Potential Unleased (acres)	Moderate Potential (acres)	Moderate Potential Unleased (acres)	Low Potential (acres)	Negligible Potential (acres)
Closed	71,100	5,600	522,200	86,200	124,100	59,500
Open (standard conditions)	5,900	700	36,600	3,900	130,000	300
TL ¹	16,900	300	90,100	3,500	16,300	0
CSU ¹	100,200	6,400	471,700	32,300	252,100	1,900
NSO ¹	58,100	3,100	333,200	27,100	155,800	900

Source: BLM GIS 2019

¹ Stipulation acreages may overlap; therefore, they cannot be summed to equal the total acreage with a given potential.

*BLM Alternative C (Includes Sub-Alternatives C1 to C6; applying only to Fluid Minerals)*Lands and Realty

Under Alternative C, managing 2,800 acres of BLM surface land as ROW exclusion and 5,900 acres as ROW avoidance would limit the ability to access fluid mineral and other mineral development sites. Impacts would slightly increase compared with the BLM No Action Alternative, which would not place any restrictions on ROW authorization.

Fluid Minerals

Under BLM Sub-Alternatives C1-C6, the unleased high potential acres closed to leasing would be the same as under the BLM No Action Alternative. The unleased moderate potential acres closed to leasing would be the same as the BLM No Action Alternative under BLM Sub-Alternatives C1-C5 but would increase under BLM Sub-Alternative C6. The acreage subject to NSO stipulations would vary as described in the subsections below.

BLM Sub-Alternative C1

Table 3-40 shows the management that would apply to fluid minerals by development potential under this sub-alternative. Approximately 3 percent of unleased acres with high development potential would be subject to NSO stipulations. This is compared with a total of 1 percent of unleased high-potential acres subject to NSO stipulations under the BLM No Action Alternative. Approximately 13 percent of unleased moderate-potential areas would be subject to NSO stipulations; 3 times as many acres as the BLM No Action Alternative. The 2019 RFD projects that up to approximately 1,865 new wells would be drilled on federal mineral estate over the next 20 years under this alternative, a less than 1 percent decrease compared with the BLM No Action Alternative. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells on federal mineral estate is 179 million barrels of oil (a less than 1 percent decrease from the BLM No Action Alternative) and 2.9 billion mcf of gas (a less than 1 percent decrease from the BLM No Action Alternative; **Appendix I**).

Table 3-40
Fluid Mineral Leasing, BLM Sub-Alternative C1

Lease	High Potential (acres)	High Potential Unleased (acres)	Moderate Potential (acres)	Moderate Potential Unleased (acres)	Low Potential (acres)	Negligible Potential (acres)
Closed	100	0	33,800	10,400	25,300	800
Open (standard conditions)	35,500	4,300	254,200	54,000	353,700	41,200
TL ¹	16,300	300	278,200	19,800	21,700	0
CSU ¹	152,600	9,500	790,100	60,600	184,600	14,100
NSO ¹	5,700	400	85,700	16,700	30,900	11,500

Source: BLM GIS 2019

¹ Stipulation acreages may overlap; therefore, they cannot be summed to equal the total acreage with a given potential.

BLM Sub-Alternative C2

Like BLM Sub-Alternative C1, under BLM Sub-Alternative C2, 3 percent of unleased acres with high development potential would be subject to NSO stipulations (**Table 3-41**). This is compared with a total of 1 percent of unleased high-potential acres subject to NSO stipulations under the BLM No Action Alternative. Approximately 17 percent of unleased moderate-potential areas would be subject to NSO stipulations; 4 times as many acres as the BLM No Action Alternative. The 2019 RFD projects that up to approximately 1,862 new wells would be drilled on federal mineral estate over the next 20 years under this alternative, a less than 1 percent decrease compared with the BLM No Action Alternative. The estimated

Table 3-41
Fluid Mineral Leasing, BLM Sub-Alternative C2

Lease	High Potential (acres)	High Potential Unleased (acres)	Moderate Potential (acres)	Moderate Potential Unleased (acres)	Low Potential (acres)	Negligible Potential (acres)
Closed	100	0	33,800	10,400	24,800	800
Open (standard conditions)	35,500	4,300	248,500	49,800	344,600	32,500
TL ¹	16,300	300	278,300	19,800	21,700	0
CSU ¹	152,700	9,500	790,600	60,600	184,700	14,100
NSO ¹	5,800	400	93,100	22,000	41,900	20,800

Source: BLM GIS 2019

¹ Stipulation acreages may overlap; therefore, they cannot be summed to equal the total acreage with a given potential.

cumulative production in the next 20 years from these new wells in addition to existing wells on federal mineral estate is 179 million barrels of oil (a less than 1 percent decrease from the BLM No Action Alternative) and 2.9 billion mcf of gas (a less than 1 percent decrease from the BLM No Action Alternative; **Appendix I**).

BLM Sub-Alternative C3

Like BLM Sub-Alternative C1, under BLM Sub-Alternative C3, 3 percent of unleased acres with high development potential would be subject to NSO stipulations (**Table 3-42**). This is compared with a total of 1 percent of unleased high-potential acres subject to NSO stipulations under the BLM No Action Alternative. Approximately 23 percent of unleased moderate-potential areas would be subject to NSO stipulations; 6 times as many acres as the BLM No Action Alternative. The 2019 RFD projects that up to approximately 1,859 new wells would be drilled on federal mineral estate over the next 20 years under this alternative, a less than 1 percent decrease compared with the BLM No Action Alternative. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells on federal mineral estate is 179 million barrels of oil (a less than 1 percent decrease from the BLM No Action Alternative) and 2.9 billion mcf of gas (a less than 1 percent decrease from the BLM No Action Alternative; **Appendix I**).

Table 3-42
Fluid Mineral Leasing, BLM Sub-Alternative C3

Lease	High Potential (acres)	High Potential Unleased (acres)	Moderate Potential (acres)	Moderate Potential Unleased (acres)	Low Potential (acres)	Negligible Potential (acres)
Closed	100	0	33,800	10,400	24,800	800
Open (standard conditions)	35,500	4,300	236,600	43,700	337,200	24,400
TL ¹	16,300	300	278,200	19,800	21,700	0
CSU ¹	152,600	9,500	790,100	60,600	184,600	14,100
NSO ¹	5,700	400	108,700	30,900	51,400	29,400

Source: BLM GIS 2019

¹ Stipulation acreages may overlap; therefore, they cannot be summed to equal the total acreage with a given potential.

BLM Sub-Alternative C4

Under BLM Sub-Alternative C4, 10 percent of unleased acres with high development potential would be subject to NSO stipulations (**Table 3-43**). This is compared with a total of 1 percent of unleased high-

Table 3-43
Fluid Mineral Leasing, BLM Sub-Alternative C4

Lease	High Potential (acres)	High Potential Unleased (acres)	Moderate Potential (acres)	Moderate Potential Unleased (acres)	Low Potential (acres)	Negligible Potential (acres)
Closed	100	0	33,800	10,400	24,800	800
Open (standard conditions)	34,700	3,700	214,700	37,700	334,600	13,700
TL ¹	16,300	300	278,300	19,800	21,700	0
CSU ¹	152,700	9,500	790,600	60,600	184,700	14,100
NSO ¹	7,000	1,400	135,500	38,700	55,500	42,900

Source: BLM GIS 2019

¹ Stipulation acreages may overlap; therefore, they cannot be summed to equal the total acreage with a given potential.

potential acres subject to NSO stipulations under the BLM No Action Alternative. Approximately 29 percent of unleased moderate-potential areas would be subject to NSO stipulations; 8 times as many acres as the BLM No Action Alternative. The 2019 RFD projects that up to approximately 1,856 new wells would be drilled on federal mineral estate over the next 20 years under this alternative, a less than 1 percent decrease compared with the BLM No Action Alternative. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells on federal mineral estate is 178 million barrels of oil (a less than 1 percent decrease from the BLM No Action Alternative) and 2.9 billion mcf of gas (a less than 1 percent decrease from the BLM No Action Alternative; **Appendix I**).

BLM Sub-Alternative C5

Under BLM Sub-Alternative C5, 22 percent of unleased acres with high development potential would be subject to NSO stipulations (**Table 3-44**). This is compared with a total of 1 percent of unleased high-potential acres subject to NSO stipulations under the BLM No Action Alternative. Approximately 32 percent of unleased moderate-potential areas would be subject to NSO stipulations; 9 times as many acres as the BLM No Action Alternative. The 2019 RFD projects that up to approximately 1,848 new wells would be drilled on federal mineral estate over the next 20 years under this alternative, a 1 percent decrease compared with the BLM No Action Alternative. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells on federal mineral estate is 178 million barrels of oil (a less than 1 percent decrease from the BLM No Action Alternative) and 2.9 billion mcf of gas (a less than 1 percent decrease from the BLM No Action Alternative; **Appendix I**).

Table 3-44
Fluid Mineral Leasing, BLM Sub-Alternative C5

Lease	High Potential (acres)	High Potential Unleased (acres)	Moderate Potential (acres)	Moderate Potential Unleased (acres)	Low Potential (acres)	Negligible Potential (acres)
Closed	100	0	33,800	10,400	24,800	800
Open (standard conditions)	30,400	2,900	196,100	34,500	327,200	4,500
TL ¹	16,300	300	278,300	19,800	21,700	0
CSU ¹	152,700	9,500	790,600	60,600	184,700	14,100
NSO ¹	16,000	3,000	162,300	42,700	63,600	54,100

Source: BLM GIS 2019

¹ Stipulation acreages may overlap; therefore, they cannot be summed to equal the total acreage with a given potential.

BLM Sub-Alternative C6

Like BLM Sub-Alternative C1, under BLM Sub-Alternative C6, 3 percent of unleased acres with high development potential would be subject to NSO stipulations (**Table 3-45**). This is compared with a total of 1 percent of unleased high-potential acres subject to NSO stipulations under the BLM No Action Alternative. Approximately 12 percent of unleased moderate-potential acres would be closed (a 52 percent increase compared with the BLM No Action Alternative), with another 19 percent subject to NSO stipulations (5 times as many acres as the BLM No Action Alternative). The 2019 RFD projects that up to approximately 1,853 new wells would be drilled on federal mineral estate over the next 20 years under this alternative, a 1 percent decrease compared with the BLM No Action Alternative. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells on federal mineral estate is 178 million barrels of oil (a less than 1 percent decrease from the BLM No Action Alternative) and 2.9 billion mcf of gas (a less than 1 percent decrease from the BLM No Action Alternative; **Appendix I**).

**Table 3-45
Fluid Mineral Leasing, BLM Sub-Alternative C6**

Lease	High Potential (acres)	High Potential Unleased (acres)	Moderate Potential (acres)	Moderate Potential Unleased (acres)	Low Potential (acres)	Negligible Potential (acres)
Closed	100	0	41,400	15,800	43,900	19,300
Open (standard conditions)	35,500	4,300	236,800	43,700	337,400	24,400
TL ¹	16,300	300	278,300	19,800	21,700	0
CSU ¹	152,700	9,500	789,100	59,400	181,200	9,400
NSO ¹	5,800	400	101,500	25,600	35,100	14,500

Source: BLM GIS 2019

¹ Stipulation acreages may overlap; therefore, they cannot be summed to equal the total acreage with a given potential.

BLM Alternative D

Lands and Realty

Managing 2,800 acres of BLM surface land as ROW exclusion and 5,900 acres as ROW avoidance would limit the ability to access fluid mineral and other mineral development sites. Impacts would slightly increase compared with the BLM No Action Alternative, which would not place any restrictions on ROW authorization.

Fluid Minerals

Table 3-46 shows the management that would apply to fluid minerals by development potential under this alternative. Impacts of closures and NSO stipulations on unleased high-potential areas under this alternative would be the same as those under the BLM No Action Alternative. Approximately 7 percent of unleased moderate-potential acres would be closed; with the same amount as the BLM No Action Alternative. Approximately 4 percent of unleased moderate-potential acres would be subject to NSO stipulations under BLM Alternative D; essentially the same amount as the BLM No Action Alternative. The limitations on fluid mineral development resulting from these closures and stipulations would be the same as the BLM No Action Alternative. Like under the BLM No Action Alternative, the 2019 RFD projects that up to approximately 1,881 new wells would be drilled on federal mineral estate over the next 20 years under this alternative. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells on federal mineral estate is 180 million barrels of oil (a less than 1 percent increase from the BLM No Action Alternative) and 2.9 billion mcf of gas (a less than 1 percent increase from the BLM No Action Alternative; **Appendix I**).

Table 3-46
Fluid Mineral Leasing, BLM Alternative D

Lease	High Potential (acres)	High Potential Unleased (acres)	Moderate Potential (acres)	Moderate Potential Unleased (acres)	Low Potential (acres)	Negligible Potential (acres)
Closed	100	0	41,400	10,400	43,900	19,300
Open (standard conditions)	36,900	4,100	236,800	64,600	337,400	24,400
TL ¹	16,300	0	278,300	0	21,700	0
CSU ¹	152,700	9,800	789,100	56,900	181,200	9,400
NSO ¹	1,500	0	101,500	200	35,100	14,500

Source: BLM GIS 2019

¹ Stipulation acreages may overlap; therefore, they cannot be summed to equal the total acreage with a given potential.

BIA Alternatives

Impacts Common to All BIA Alternatives

The BIA alternatives do not apply NSO, CSU, TL, or stipulation allocations limiting the locations of oil and gas development. Instead, stipulations are applied in line with the focus of each alternative. Under all BIA alternatives, lessees would be required to comply with applicable regulations and to conduct operations with due regard for proper land management. This would include restrictions on timber destruction, limitations on vehicle access (limited to the approved access road), road maintenance requirements, and other measures. As described in the Affected Environment Supplemental Report, Section AE.3.2, Minerals: *Nature and Type of Effects*, these types of restrictions would not reduce the total amount of oil and gas development in the BIA mineral decision area unless they rendered development uneconomical.

Under all BIA alternatives, the 2019 RFD projects that up to 510 new wells would be drilled in the BIA mineral decision area over the next 20 years. This includes an estimated 141 new wells on Navajo Tribal trust minerals and another 369 new wells on individual Indian allotment minerals (**Appendix I**). The estimated cumulative production in the next 20 years from new wells in addition to existing wells in the BIA mineral decision area is 45 million barrels of oil and 811 million mcf of gas. This includes an estimated 12 million barrels of oil and 224 million mcf of gas from Navajo Tribal trust minerals and 32 million barrels of oil and 588 million mcf of gas from individual Indian allotment minerals (**Appendix I**).

BIA No Action Alternative

Under the BIA No Action Alternative, current management would continue. This would include a 500-foot setback from residential and community structures, which would continue to limit oil and gas development as described in the Environmental Consequences Supplemental Report, Section EC.5.2, Minerals: *Nature and Type of Effects*. As noted in that section, these types of restrictions would not reduce the total amount of oil and gas development in the BIA mineral decision area unless they rendered development uneconomical.

BIA Alternative A

Under this alternative, the BIA would apply a 1,320-foot (0.25-mile) setback from residential and community structures. This stipulation would reduce the area available for locating a well compared with the 500-foot setback stipulated under the BIA No Action Alternative; however, in most cases permittees would be able to use directional drilling to access fluid mineral resources, reducing the impact of this stipulation on mineral resources. Noise and light restrictions would also add requirements for development and potentially increase costs. These types of restrictions would not reduce the total amount of oil and gas development in the BIA mineral decision area unless they rendered development uneconomical.

BIA Alternative B

Impacts of the 1,320-foot (0.25-mile) setback from residential and community structures and noise and light restrictions would be the same as those described under BIA Alternative A.

Under this alternative, directional drilling may be required to hide proposed well locations from culturally sensitive viewpoints. Directional drilling might not be practical in all areas, depending on the length of directional wellbore required, or the added expense might discourage drilling in certain areas. As a result, fluid mineral extraction could be reduced in some areas compared with the BIA No Action Alternative.

Access roads would be designed to follow the contour of the landform and/or mimic lines in vegetation. This can require constructing longer access roads, leading to increased costs compared with the BIA No Action Alternative. The total amount of oil and gas development would not be reduced unless these restrictions rendered development uneconomical.

BIA Alternative C

Impacts of the 1,320-foot (0.25-mile) setback from residential and community structures and noise and light restrictions would be the same as those described under BIA Alternative A.

Impacts of requiring directional drilling and access roads following the contour of the landform would be the same as those described under BIA Alternative B.

BIA Alternative D

Impacts of the 500-foot setback from residential and community structures would be similar to those described under the BIA No Action Alternative; however, this alternative would remove the setback requirement from reservoirs of water, live streams, and other bodies of water, opening additional areas to well pad development when compared with the BIA No Action Alternative.

Impacts of noise and light restrictions would be the same as those under BIA Alternative A.

Cumulative Impacts

The cumulative impact analysis area used to analyze cumulative impacts on mineral extraction is the planning area, regardless of mineral ownership. Past, present, and reasonably foreseeable future actions and conditions in the cumulative impact analysis area that have affected and will likely continue to affect mineral extraction are mineral development activities outside the BLM and BIA mineral decision areas. Mineral development is expected to continue to occur in these areas. The closures and restrictions considered in the BIA and BLM alternatives and discussed in the context of the decision areas for analyzing direct and indirect impacts are analyzed here in the context of the entire planning area to assess cumulative impacts. While the BIA would not apply any allocations closing areas to leasing under any alternative, the agency would apply varying degrees of restrictions to oil and gas development under the alternatives.

Under all BLM and BIA alternatives, current trends for oil and gas development activities in the planning area are expected to continue. Under BLM and BIA Alternative A, the BLM and BIA would apply the second-most restrictions in the decision areas, including in high-potential areas. The closures that would be applied in the BLM mineral decision area would cover approximately 11 percent of the high-potential oil and gas resources in the entire planning area. The 2019 RFD projects that up to approximately 2,619 new wells would be drilled in the planning area over the next 20 years under this alternative, a 15 percent decrease compared with the BLM and BIA No Action Alternatives. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells in the planning area under BLM and BIA Alternative A is 234 million barrels of oil (a 14 percent decrease from the BLM and BIA No Action Alternatives) and 4.5 billion mcf of gas (a 10 percent decrease from the BLM and No Action Alternatives; **Appendix I**).

Under BLM and BIA Alternative B1, the closures in the BLM mineral decision area would cover 7 percent of high-potential oil and gas resources in the entire planning area. The 2019 RFD projects that up to

approximately 2,682 new wells would be drilled in the planning area over the next 20 years under this alternative, a 13 percent decrease compared with the BLM and BIA No Action Alternatives. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells in the planning area under BLM and BIA Alternative B is 238 million barrels of oil (a 12 percent decrease from the BLM and BIA No Action Alternatives) and 4.5 billion mcf of gas (a 9 percent decrease from the BLM and No Action Alternatives; **Appendix I**).

Under BLM and BIA Alternative B2, the agencies would apply the most restrictions in the decision areas. The closures in the BLM mineral decision area would cover approximately 24 percent of the high-potential oil and gas resources in the entire planning area. The 2019 RFD projects that up to approximately 2,345 new wells would be drilled in the planning area over the next 20 years under this alternative, a 24 percent decrease compared with the BLM and BIA No Action Alternatives. The estimated cumulative production in the next 20 years from these new wells in addition to existing wells in the planning area under BLM and BIA Alternative A is 204 million barrels of oil (a 24 percent decrease from the BLM and BIA No Action Alternatives) and 4.2 billion mcf of gas (a 15 percent decrease from the BLM and No Action Alternatives; **Appendix I**).

The closures in the BLM mineral decision area would cover less than 1 percent of high-potential oil and gas resources in the planning area under BLM Alternatives C and D and the BLM No Action Alternative; however, the BLM and BIA would apply increased unmapped restrictions on oil and gas development, such as setbacks from residential and community structures, under Alternative C. The 2019 RFD projects that between approximately 3,068 and 3,085 new wells would be drilled in the planning area over the next 20 years under BLM and BIA Alternative C, including all sub-alternatives. Under BLM and BIA Alternative D, the 2019 RFD projects that up to approximately 3,101 new wells would be drilled in the planning area over the next 20 years. There would be no appreciable difference in estimated production between BLM and BIA Alternatives C and D and the BLM and BIA No Action Alternatives (**Appendix I**). Under all alternatives, mineral resources in some NSO areas could still be accessed by directional or horizontal drilling from areas with no NSO stipulation.

3.5.3 Forestry

Affected Environment

Current Conditions and Trends

Forest woodland community types in the planning area are pinyon-juniper, oak woodlands, and ponderosa pine-mixed conifer. In total, these communities cover approximately 1,018,100 acres, or 47 percent of the planning area (**Section 3.4.5, Upland Vegetation**). There are no specific portions of the planning area identified for forest product harvest; therefore, forest products may be obtained from any areas that are not closed to protect other resources.

Forest products in the planning area are firewood, Christmas trees, wildlings, wood posts and poles, and special forest products, such as pinyon nuts.

Forest resiliency and condition in the assessment area is variable across the landscape (**Section 3.4.5, Upland Vegetation**). The level to which forest and woodland communities have departed from their historical conditions can affect the risk of disturbance to this community and the level of available products.

Threats to forest resiliency and condition may affect the level of products available for sale or use. Potential threats are population growth; disease; insects; expansion of wildland-urban interface areas; fragmentation due to energy development; threat of wildfire from potential drought, disease, climate fluctuations and changes, and successional changes; and establishment and spread of invasive species.

BLM-Managed Forest

Current conditions on BLM-managed forest in the BLM surface decision area are described in the 2003 RMP (BLM 2003). **Appendix G** describes forest woodland community types.

BIA-Managed Forest

The Navajo Nation's Ten-Year Forest Management Plan establishes goals and objectives for management of its forests and woodlands. Navajo woodlands comprise roughly 4.8 million acres over numerous types of terrain (Navajo Nation, n.d.). Traditionally, the pine and fir upland ecosystems associated with the Defiance Plateau and Chuska Mountains have been referred to as the Navajo Forest. This area of nearly 600,000 acres has provided valued cultural and subsistence resources to the Navajo people for hundreds of years and has been the resource base for the Navajo Nation's timber industry.

The Navajo Forest is centrally located in the Navajo Nation and straddles the Arizona/New Mexico state line. Portions of the Navajo Forest are in Apache County, Arizona and McKinley and San Juan Counties, New Mexico, which are partially in the planning area. The town of Window Rock lies at the southern end of this forested area.

The Navajo Forest is rich with many resources (Navajo Nation, n.d.). Some, such as timber, are recognized for their economic value today. Other resources, such as medicinal and ceremonial plants, are significant to Navajo culture or tradition or more broadly with threatened and endangered plant and wildlife species.

Of Navajo Nation woodlands, 1,139,100 acres were classified as commercial, 75 percent of which (854,300 acres) are considered manageable. No commercial forest activities are permitted around lakes, streams, wetlands, and cultural/sacred areas.

The harvesting of any forest/woodland products requires a permit from the Navajo Forestry Department and BIA (Navajo Nation, n.d.). Most of the harvesting is done by the general public through personal use permits. In many cases, the harvest areas are selected by the permittees; however, some permits are issued for specific cutting areas to meet management goals and objectives.

Harvesting on allotments is subject to the approval of the owners and the BIA. The Navajo Forestry Department also conducts management through direct harvesting for its woodlot/firewood sales program.

The Navajo Nation Ten-Year Forest Management Plan, which is strategic rather than operational, establishes forest management direction for 596,700 acres of the Defiance Plateau-Chuska Mountains, which include commercial timberland (Navajo Nation 2001). Implementing specific projects that conform to plan policies will depend on subsequent procedures for site-specific planning and design.

The Navajo commercial forest (exclusive of inoperable and restricted areas) is composed of 388,600 acres (Navajo Nation 2001). This does not include operable timberlands of 74,700 acres for SDAs and 60,100 acres of marginal timber production areas; thus, the commercial forest is 253,800 acres where even- and uneven-aged stand development would occur. The desired future condition is an even- and uneven-aged mosaic, intermixed with areas of special or no management. Allotted lands are subject to management and regulation by the BIA.

Environmental Consequences

BLM Alternatives

There are no BLM decisions being considered that would affect forestry beyond the impacts analyzed in the 2003 RMP; therefore, impacts on forestry from BLM alternatives are not discussed in the FMG RMPA/EIS.

BIA Alternatives

Impacts Common to All BIA Alternatives

Under all BIA alternatives, the BIA would authorize ROWs on a case-by-case basis. Where authorized, new ROWs could result in the removal or fragmentation of forest and woodland communities.

The BIA would continue to work with the Navajo Forestry Department to apply forest and land protection stipulations. These would prevent the cutting of, destruction of, or damage to timber without prior authorization of the Secretary and the Navajo Nation; include a requirement to pay for all timber cut,

destroyed, or damaged at rates prescribed by the BIA Navajo Regional Director; and include restrictions against interfering with the sale or removal of timber from the land. These stipulations can be found in the Navajo Nation's Ten-Year Forest Management Plan, The Navajo Nation Forest and Woodland Regulations (RCMA 48-01), the Navajo Nation's Wildlife-Timber Coordination Handbook, 25 CFR Part 163 – General Forestry Regulations, and the National Indian Forest Resources Management Act.

Under all BIA alternatives, additional surface disturbance from oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative. Where projected disturbance overlaps forest and woodland vegetation communities, site specific analysis would be conducted to limit impacts on commercial or noncommercial forest resources.

BIA No Action Alternative

Under this alternative, the BIA would continue to limit vehicular access for well sites to approved access roads and would continue to apply setbacks from structures and water bodies. This would continue to limit surface disturbances associated with new roads and facilities; it could limit the risk of impacts on commercial or noncommercial forest resources.

BIA Alternative A

Under BIA Alternative A, the BIA would require lessees to refrain from destroying or damaging woodlands and vegetation. Lessees found responsible for destroying or damaging vegetation would be required to pay for the damages at rates prescribed by the BIA Navajo Regional Director. These requirements would protect forest resources from damage by oil and gas leasing.

Requiring interim reclamation and applying larger setbacks from structures and water bodies could contribute to reduced levels of localized surface disturbance projected, compared with the BIA No Action Alternative. This would result in less potential for impacts on forestry resources.

BIA Alternative B

Requirements for lessees to avoid damaging forest resources would have the same impacts as described under BIA Alternative A.

BIA management affecting surface disturbance, and the impacts of that management on forestry resources, would be similar to those under BIA Alternative A. The exception is that requiring directional drilling and collocation of facilities could further reduce surface disturbance projected under this alternative, compared with the BIA No Action Alternative. This would result in less potential for impacts on commercial and noncommercial forestry resources.

BIA Alternative C

Requirements for lessees to avoid damaging forest resources would have the same impacts as described under BIA Alternative A.

BIA management affecting surface disturbance, and the impacts of that management on forestry resources, would be the same as those under BIA Alternative B.

BIA Alternative D

Requirements for lessees to avoid damaging forest resources would have the same impacts as described under BIA Alternative A.

Requiring interim reclamation could contribute to reduced surface disturbance under this alternative, compared with the BIA No Action Alternative.

Cumulative Impacts

Cumulative impacts on forestry would be the result of past, present, and reasonably foreseeable future actions that remove or fragment forestry and woodland vegetation communities. Past and present actions that have likely affected forestry and woodland vegetation communities in this region may include activities

such as oil, gas, and energy infrastructure development; agriculture; residential and commercial development; transportation infrastructure; mining and mineral use; vegetation management and fuel cutting; wildfire; and unauthorized collecting.

Reasonably foreseeable future actions with the potential to affect forestry and woodland vegetation communities are similar to the past and present actions. It is anticipated that the development of fluid mineral resources would continue to be a major activity that would require ground disturbance from permanent and temporary roads, pits, drilled wells, associated well pads, pipelines, and transmission lines. Solar energy development is anticipated near existing transmission facilities. More development around existing towns and cities would also be anticipated and accompany population growth. Population growth may increase the potential for more wood product gathering and cutting.

For actions on BLM surface land and federal mineral estate, impacts would continue to be minimized through existing laws, regulations, and stipulations addressing surface-disturbing activities within sensitive areas. All BLM and BIA action alternatives propose additional allocations, activities, reviews, and priorities that would reduce the potential for affecting forestry and woodland vegetation communities resulting from future actions. Other ground-disturbing activities, such as road construction, land development, and utility infrastructure, may be reviewed by other federal, state, Tribal, or local agencies for the presence of and impacts on forestry and woodland vegetation communities. Actions on private land could result in the loss of forestry and woodland vegetation communities.

The BLM and BIA would continue to consider forestry and woodland vegetation communities in management decisions, actions, and projects that may cause ground or other disturbance, which could result in long-term, direct damage or loss of important populations. There would be the greatest potential for removal or fragmentation of forests and woodlands under the BLM and BIA No Action Alternatives and Alternative D. This is because those alternatives would manage the fewest acres as ROW avoidance and exclusion areas and allow oil and gas development throughout the largest portion of the decision area.

Under Alternatives A through C, the BLM and BIA would minimize impacts on forestry and woodland vegetation communities from resource use and development. The agencies would minimize cumulative impacts on forestry resources to the extent practical and feasible through restrictions, stipulations, closures to mineral exploration and development, application of conditions of approval, and by concentrating development in previously disturbed areas. Forestry and woodland conditions would be improved through vegetation treatments and management, habitat improvements, prescribed and wildland fire use, and proper agricultural practices. Restrictions on resource uses would be the greatest under BLM and BIA Alternative B, which would result in the least potential for cumulative impacts.

3.5.4 Lands and Realty

Affected Environment

This section is a discussion of existing land uses and the regulatory framework guiding land use and realty actions on BLM-managed, Tribal trust, allotted, and fee simple lands in the planning area.

Current Conditions

The distribution of BLM-managed, Tribal trust, and allotted lands directly influences the current level and locations of uses in the planning area. The 1,316,200 acres of BLM-managed lands are more contiguous in northeastern San Juan County; a scattered, checkerboard pattern characterizes the distribution of BLM-managed lands throughout the rest of the planning area.

The 1,518,100 acres of Tribal trust lands in the Navajo Nation, Jicarilla Apache Nation, and Ute Mountain Ute Tribe reservation are in the west, northwest, and eastern portions of the planning area, respectively. Navajo Nation lands are also scattered throughout the southern and central portions of the planning area. The surface in the planning area is managed or owned by the BLM, the Forest Service, the BOR, the NPS,

Tribal and state governments, individual Indian allottees, and private entities (see **Table 3-47** and **Figure 3-24**, BIA Surface and Subsurface Management).

Table 3-47
Surface Landownership in the Planning Area

Landownership	Acres
BLM	1,316,200
Tribal trust	1,518,100
Private	458,300
Forest Service	251,500
Individual Indian allotments	210,100
State	203,700
Navajo Tribal fee	170,800
NPS	33,600
BOR	27,200
Total	4,189,500

BLM GIS 2017

BLM

The BLM lands and realty actions described in this section are land tenure (ownership) adjustments, and land use authorizations. Land tenure adjustments focus primarily on land exchange, acquisition (including acquisition through purchase of land and interest in), and sale, exchange, or conveyance. Land use authorizations consist of ROWs, communication site leases, and other leases or permits.

This section also describes utility corridors, which are a land use planning-level designation to facilitate the orderly placement of linear ROWs.

Land Tenure Adjustments

BLM-managed lands are retained in federal ownership, as mandated by FLPMA, with the exception of lands identified in a land use plan for sale, exchange, or conveyance. To be eligible for sale, exchange, or conveyance, lands must meet certain FLPMA criteria, such as being difficult or uneconomical to manage. Lands identified for sale, exchange, or conveyance must have the potential to support community expansion, economic development, or other public purposes that cannot be achieved prudently or feasibly on land other than public land. Another requirement is that the public purposes for sale, exchange, or conveyance outweigh other objectives and values, including recreation and scenic values, that would be served by maintaining the tract in federal ownership. Withdrawn federal lands are withheld from settlement, sale, location, or entry under some or all the general land laws, and may be relinquished, in accordance with the provisions and limitations of FLPMA. Land tenure adjustments must serve the national interest and meet the criteria in FLPMA (43 CFR 2300-2400).

Land Use Authorizations

Land use authorizations in the decision area include those for infrastructure such as roads, transmission lines, water facilities, communication sites, and oil and gas distribution lines. A ROW is the most common form of authorization to permit uses of BLM-managed lands by commercial, private, or government entities for specific purposes and projects. The ROW authorizes rights and privileges for a specific period and is subject to BLM review and renewal or denial. All ROWs are subject to an analysis of potential resource impacts under NEPA.

Unless specifically designated in the land use plan or amendments to the plan, BLM-managed lands in the planning area are available for land use authorizations. Certain lands in the decision area are designated to be avoided or excluded from new ROW development, such as ACECs, wilderness areas, SRMAs, or areas near sensitive cultural or biological resources. Additional information on ROWs is included in the Affected Environment Supplemental Report, Section AE.3.4, Lands and Realty.

There are nearly 18,000 BLM-issued ROWs in the planning area, 76 percent (13,700) of which are for oil and gas pipelines (BLM 2016b). In general, there is a higher concentration of ROWs and communication sites near the tri-cities area of Farmington, Bloomfield, and Aztec.

The BLM also authorizes solar and wind energy projects via the ROW authorization process (see Affected Environment Supplemental Report, Section AE.3.4, Lands and Realty). In 2012, the BLM published the Solar Programmatic EIS (BLM 2012b) where it identified developable acreage in solar energy zones (SEZs) and variance areas where solar energy development may be appropriate, pending further analysis. There are no SEZs in the FFO; however, there are approximately 391,100 acres of solar variance areas (BLM 2012b).

There is currently one solar energy project in the planning area on private land. While the generation facility will not be on BLM-managed lands, the BLM would process ROWs for such facilities as transmission lines and roads that cross BLM-managed land in the decision area. Additionally, the City of Aztec is considering a solar project on its lands.

Utility Corridors

There is one BLM-designated utility corridor in the planning area—the West-wide Energy Corridor #80-273 (BLM 2009) established under the authority of Section 368 of the Energy Policy Act (PL 109-58). The 3,500-foot-wide corridor extends from the southeastern corner of the planning area to the northwestern corner at the Colorado border. It mostly coincides with US Highway 550 and contains existing pipeline infrastructure.

Tribal Trust and Individual Indian Allotment Lands

Tribal trust lands are those owned by the Tribe for which the title is held in trust by the federal government. These lands include treaty lands that are part of an existing reservation. Allotted lands are held in trust specifically for members of a federally recognized Tribe. Within the Navajo Nation, there are also privately-owned lands that are not held in trust by the BIA; Navajo and non-Navajo individuals own these fee simple lands. See **Figure 3-24**, BIA Surface and Subsurface Management, for a depiction of Tribal trust, allotted, and Tribal fee simple lands in the planning area. **Table 3-48** provides acres for each Tribal ownership category; **Table 3-49** provides Tribal ownership acres in the Navajo Nation.

**Table 3-48
Tribal Ownership in the Planning Area**

Landownership	Acres
Ute Mountain Ute Tribe	103,300
Jicarilla Apache Nation	739,400
Navajo Nation	675,360
Total	1,518,060

BLM GIS 2017

**Table 3-49
Navajo Nation Ownership**

Navajo Nation Landownership	Acres
Navajo Tribal trust (non-allotment)	675,360
Allotted	210,100
Navajo Tribal fee (private land)	170,800
Total	1,056,260

BLM GIS 2017

The BIA has the authority to grant interest in lands, with the consent of the allottees for allotted land and consent of the Tribe for Tribal trust land, including the issuance of ROWs, easements, and leases. The BIA can acquire lands from a willing seller, such as for residential, commercial, or mineral development. When the BIA acquires land in trust for a Tribe, the property is not subject to state or local land use regulations;

only federal and Tribal land use regulations are applicable on trust lands. The BIA cannot sell or dispose of Tribal trust lands without the consent of the Tribe.

Regulations governing the placement of land uses, including oil and gas development facilities, infrastructure, and utilities, vary by Tribe. Where applicable, the BIA cooperates with the BLM and local and state authorities on matters related to land use. Additional information on lands managed by the BIA is included in the Affected Environment Supplemental Report, Section AE.3.4, Lands and Realty.

Under general supervision of the BIA Superintendent, with wide latitude for exercising initiative, discretion, and independent judgment, the BIA Navajo Regional Office Eastern Navajo Agency studies and analyzes, recommends, develops, and puts into place plans for the highest and best use of Tribal and Indian allotment trust lands within the jurisdiction of the Eastern Navajo Agency. This oversight includes areas with high economic development potential, suitable for agricultural, commercial, industrial, and residential purposes.

Eastern Navajo Agency management amounts to the following:

- Evaluating the present use of land
- Determining the highest and best potential use of land, using information furnished by experts in and, as needed, outside the federal government
- Recommending changes in uses in specific parcels of land from present use to a more beneficial use, considering socioeconomic, cultural, and political concerns affecting individual Tribal members, the Navajo Tribe, surrounding communities, and the state
- Acting to implement projects for the ultimate benefit of individuals or groups involved in managing the land in their highest and best use

In addition, the Eastern Navajo Agency supports the self-determination goals of the Navajo Nation on land consolidation, natural resources, and mineral and surface rights protection and management. Eastern Navajo Agency manages approximately 1.6 million acres in San Juan, Sandoval, McKinley, Bernalillo, Valencia, and Socorro Counties, which also includes the FMG RMPA/EIS planning area.

Existing land uses on Tribal trust, allotted, and Tribal fee lands in the planning area generally include home sites; agricultural lands; commercial development; roads; electrical transmission lines; water facilities; communication sites; and oil and gas well pads, pipelines, and access roads.

Existing uses on the Navajo Nation portion of the planning area consist of agricultural lands, residential and commercial development in communities such as Ojo Amarillo, local paved and unpaved roads, State Highway 371, US Highway 550, and oil and gas wells. The agricultural uses in the Navajo Nation are mostly in the northern portion of the planning area. This is because of the availability of irrigation water from the NIIP, which provides water for approximately 70,000 acres of land in the Navajo Nation south of Farmington (BOR 2017). Most oil and gas development in the Navajo Nation is in the southern portion of the planning area.

Various chapter land use plans guide land use planning and economic and community development in the Navajo Nation. The San Juan Chapter Community-Based Land Use Plan (Navajo Nation 2002) includes goals and policies for natural resources and community infrastructure, with an emphasis on housing and community and public facilities.

Land uses in the Ute Mountain Ute Tribe portion of the planning area consist mainly of oil and gas wells and rural, unpaved access roads. There are no lands used for agriculture, urban commercial uses, or residential development. Infrastructure development is mostly associated with the oil and gas wells.

The most prevalent land use in the Jicarilla Apache Nation portion of the planning area is oil and gas development. Most of it is in the northeast portion of the planning area. Uses supporting this development are unpaved access roads, pipelines, and overhead power lines. Other uses consist of paved and unpaved local access roads, State Highway 95, and US Highway 64. There are dispersed residential and commercial

uses throughout the Jicarilla Apache Nation portion of the planning area; these uses are primarily near the northeast corner of the planning area in Dulce and in the southeast portion of the planning area in the communities of La Jara and Regina.

BIA-Managed Withdrawals

In the planning area, there are 212,600 acres of lands withdrawn from the public domain via Public Land Order 2198 or other administrative action. The BIA administers these lands and the Navajo Nation has a vested interest, but the underlying landownership consists of a combination of Navajo Tribal trust, individual Indian allotted, Navajo Tribal fee, and BLM-managed public lands. See **Figure 3-24**, BIA Surface and Subsurface Management, for a depiction of BIA-managed withdrawn lands in the planning area.

Trends

Land Tenure Adjustments and Landownership

The BLM will continue to acquire, sell, and exchange land and interest in land in the FFO on a case-by-case basis. It will give all proposals the full consideration of public benefits and land management goals. The BLM will prioritize acquisitions that would result in the following:

- Consolidate the lands it administers to facilitate and enhance its management
- Support the multiple-use mandate, including lands with high oil and gas or other energy-related or resource potential
- Create easements to support resource management

Demand for land tenure adjustments is anticipated to increase, particularly in the tri-cities area. Acquiring land or easements for public access has not been a major focus for the FFO in recent years, in part due to limited opportunities; however, as the demand for securing public access for recreation on BLM-managed land near growing communities continues to increase, acquisitions for access could also increase. Additional management opportunities may exist to identify small, isolated land tracts lacking adequate access, parcels that would resolve trespass issues, and those that would meet requirements in Public Law 96-550, Part V, Chaco Culture National Historical Park.

The BIA will continue to evaluate the acquisition of new trust lands on a case-by-case basis. Any future additions to Tribal trust or allotted lands would be subject to the willingness of the current landowner or administrator to transfer the lands into trust.

The Navajo Nation participated in the outreach portion of the Federal Land Buyback Program, where the federal government purchased fractional interests in allotments and conveyed the interests to the Navajo Nation. The lands are often already held in Tribal trust by the federal government, associated with a specific Tribe that exercises jurisdiction over the land. Purchased lands would become Tribal trust lands specifically associated with the Navajo Nation.

No lands in the planning area are anticipated to be transferred out of the Tribal trust.

Land Use Authorizations

Continued population growth in the tri-cities area is likely to increase the demand for ROWs, such as roads, power lines, and communication facilities, to support the urban expansion. This growth would likely lead to more urban and commercial uses on Tribal trust lands, especially in the Navajo Nation south of Farmington. Due to the increase in oil and gas development and the associated infrastructure, it is likely that land use authorizations in rural areas, both on BLM-managed and Tribal trust lands, would also increase.

Environmental Consequences

BLM Alternatives

Impacts Common to All BLM Alternatives

Under all alternatives, on 54,100 acres associated with wilderness and other legislatively designated areas, there would be no new ROWs or activities that would create a demand for new ROWs.

The BLM would continue to manage 25,000 acres as a ROW corridor consistent with the West-wide Energy Corridor Programmatic EIS (BLM 2009). Managing the corridor would support the collocation of new power line and pipeline ROWs. ROW avoidance or exclusion management would not apply in designated utility corridors under any BLM alternative, which would facilitate ROW location within these corridors.

BLM No Action Alternative

Under a continuation of current management, the BLM would evaluate ROW applications on a case-by-case basis. New ROWs would be allowed in all areas outside congressionally designated wilderness areas. There would be few limitations on the placement of new ROWs throughout the decision area. The BLM would continue to use its discretion to adjust ROW locations when needed to avoid sensitive resources. The BLM lands and realty program would also be able to accommodate demand for new ROWs associated with energy and mineral development in the decision area.

Continuing to manage 1,194,100 acres (60 percent) of the BLM surface decision area as open to fluid mineral leasing with no NSO stipulations would maintain the demand for new ROWs to accommodate fluid mineral development. Approximately 8 percent (158,500 acres) of the BLM surface decision area would be open with an NSO stipulation or closed to fluid mineral leasing. In these areas, there would continue to be no demand for new ROWs to support fluid mineral development.

In the 25,000 acres of designated corridors, the BLM would exclude uses, such as mineral material sales and recreational facilities, that could conflict with the placement of new power lines and pipelines.

Impacts Common to All BLM Action Alternatives

Under all of its action alternatives, the BLM would consider up to 3,400 acres for exchange with the NPS to comply with Public Law 96-550. Compared with the BLM No Action Alternative, this exchange could allow for more effective management of CCNHP if it were to occur.

BLM Alternative A

Under BLM Alternative A, excluding ROW development on 28,800 acres (2 percent of the BLM surface decision area) would decrease the BLM's ability to accommodate the demand for new ROWs in the decision area compared with the BLM No Action Alternative. Non-oil and gas ROWs would be allowed in some areas. This exception would limit the placement of new fluid mineral infrastructure but would allow other types of ROWs.

The BLM would manage 1,060,400 acres (81 percent of the BLM surface decision area) as ROW avoidance areas. In ROW avoidance areas, the placement of new ROWs would be subject to special siting criteria, design requirements, or other constraints to minimize resource impacts. Avoidance criteria could limit or preclude new ROW development in those areas. In some areas, ROW avoidance criteria would apply only to fluid mineral ROWs. This would allow non-oil and gas ROWs, such as power lines, to be placed in avoidance areas subject to standard permitting conditions.

On the remaining portion of the BLM surface decision area (226,600 acres; 17 percent) managed as open to new ROW development, there would be minimal impacts on the BLM's ability to accommodate new ROW development. Standard conditions of approval and permitting requirements would apply.

On the 211,200 acres (16 percent) of the BLM surface decision area managed as open to fluid mineral leasing with no NSO stipulations, there would be demand for new ROWs to support oil and gas activity. Managing approximately 94 percent (1,227,400 acres) of the BLM surface decision area as closed to fluid mineral leasing or open with an NSO stipulation would reduce demand for new oil and gas-related ROWs in the decision area compared with the BLM No Action Alternative. Requiring new oil and gas wells to be collocated at existing well sites would result in new road and pipeline ROWs being collocated with existing infrastructure.

In addition to the West-wide energy corridor, there would be additional 2,500-foot-wide corridors, for a total of 104,000 acres of designated utility corridors. The 2,500-foot-wide corridors would encompass

several existing ROWs and would encourage collocation of new power lines and pipelines. Compared with the BLM No Action Alternative, there would be more opportunities to collocate new infrastructure in a designated corridor. Requiring new oil and gas wells to be collocated at existing well sites would further encourage new pipeline ROWs to be collocated in designated corridors.

BLM Alternative B (Includes BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

Excluding new ROW development on 24,800 acres (2 percent of the BLM surface decision area) under BLM Alternative B would result in similar impacts as under BLM Alternative A, with the exception that there would be 4,000 less acres where new ROWs would be excluded. This would decrease opportunities for the placement of new infrastructure compared with the BLM No Action Alternative.

Impacts from managing 956,100 acres (73 percent of the BLM surface decision area) as ROW avoidance areas would be similar to BLM Alternative A, with the exception that avoidance criteria would apply on 104,300 fewer acres. BLM Alternative B would increase the number of acres subject to avoidance criteria compared with the BLM No Action Alternative.

On the remaining portion of the BLM surface decision area (334,800 acres; 25 percent of the BLM surface decision area) managed as open to new ROW development, there would be minimal impacts on the BLM's ability to accommodate new ROW development.

In addition to the West-wide energy corridor and 2,500-foot-wide corridors, there would be additional 500-foot-wide corridors, for a total of 127,000 acres of designated utility corridors. The 500-foot-wide corridors would follow several existing pipeline ROWs and would encourage collocation of new fluid mineral infrastructure. Compared with the BLM No Action Alternative, there would be more opportunities to collocate infrastructure in designated corridors.

Fluid Minerals

BLM Sub-Alternative B1

Under BLM Sub-Alternative B1, when compared with the No Action Alternative, there would be a 16 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 426,500 acres of BLM surface decision area as NSO, and 494,700 acres of BLM surface decision area as closed to oil and gas leasing would reduce surface disturbance in those areas.

Compared with the BLM No Action Alternative, managing 921,200 acres (46 percent) of the BLM surface decision area with an NSO stipulation or closed to fluid mineral leasing would reduce demand for new oil and gas-related ROWs in those areas. On the remaining 795,700 acres (40 percent of the BLM surface decision area) managed as open to fluid mineral leasing with no NSO stipulations, there would be demand for new ROWs to support any new surface oil and gas activity.

BLM Sub-Alternative B2

Under BLM Sub-Alternative B2, when compared with the No Action Alternative, there would be a 9 percent decrease in projected new surface disturbance from oil and gas development in the BLM mineral decision area, compared with the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative). Managing 398,100 acres of BLM surface decision area as NSO, and 571,300 acres of BLM surface decision area as closed to oil and gas leasing would reduce surface disturbance in those areas.

Compared with the BLM No Action Alternative, managing 969,400 acres (48 percent) of the BLM surface decision area with an NSO stipulation or closed to fluid mineral leasing would reduce demand for new oil and gas-related ROWs in those areas. On the remaining 719,100 acres (36 percent of the BLM surface decision area) managed as open to fluid mineral leasing with no NSO stipulations, there would be demand for new ROWs to support any new surface oil and gas activity.

BLM Alternative C (Includes BLM Sub-Alternatives C1–C6; applying only to Fluid Minerals)

Under BLM Alternative C, the BLM would exclude new ROW development on 2,800 acres (<1 percent of the BLM surface decision area), which would result in slightly fewer opportunities for the placement of new infrastructure compared with the BLM No Action Alternative. Allowing non-oil and gas ROWs in some areas could allow certain types of ROWs, such as power lines, to be placed in exclusion areas, subject to avoidance criteria.

The BLM would manage 5,900 acres (<1 percent of the BLM surface decision area) as ROW avoidance areas, which would result in the types of impacts described under BLM Alternative A but on only a small percentage of the decision area. Compared with the BLM No Action Alternative, BLM Alternative C would slightly increase the number of acres subject to avoidance criteria.

With 99 percent (1,307,200 acres) of the BLM surface decision area managed as open to new ROW development, impacts on ROW development would be essentially the same as those under the BLM No Action Alternative. This is because with only 9,000 acres managed as ROW exclusion or avoidance, the viability of ROW development on the remaining areas designated as open to ROWs would not be affected.

Impacts from utility corridors would be the same as those under BLM Alternative B.

Fluid Minerals

BLM Sub-Alternatives C1 to C6

Demand from between 3,068 to 3,085 wells in the planning area under BLM Sub-Alternatives C1 to C6, would result in slightly less demand for new oil and gas-related ROWs compared with the BLM No Action Alternative. On the 1,180,200 to 1,194,100 acres (91 to 92 percent of the BLM surface decision area) managed as open to fluid mineral leasing with no NSO stipulations, there would be demand for new ROWs to support oil and gas activity, but that demand would be slightly less than the BLM No Action Alternative.

Sub-Alternative C1 would result in the least amount of change in ROW demand compared with the BLM No Action Alternative. Managing 203,800 acres of high potential areas and 1,322,500 acres of medium potential areas as open with standard conditions or open with CSU or TLs would result in nearly the same demand for new ROWs associated fluid mineral development.

Sub-Alternatives C2 to C5 would result in incrementally less demand based on associated NSO areas and projected wells. Impacts from Sub-Alternatives C2 and C3 would be nearly the same as Sub-Alternative C1 with only 7,400 and 23,200 more acres, respectively, of NSO in medium potential areas leading to negligible differences in subsequent ROW demand among Sub-Alternatives C1, C2, and C3.

Sub-Alternatives C4, C5, and C6 would result in less demand for ROWs compared with the BLM No Action Alternative with C5 having the least demand at 3,068 wells and a combined 178,900 acres of high and medium potential areas managed with NSO stipulations. Compared with the BLM No Action Alternative, there would be less potential for applications for new oil and gas-related ROWs under Alternatives C4, C5, and C6. That demand would be the least under Alternative C5 because it would have the most areas managed as NSO.

BLM Alternative D

Impacts from managing areas as ROW exclusion and avoidance would be the same as those described under BLM Alternative C.

Fluid Minerals

Under BLM Alternative D, on the 1,194,100 acres (92 percent) of the BLM surface decision area managed as open to fluid mineral leasing with no NSO stipulations, there would be demand for new ROWs to support any new oil and gas surface activity. Managing 3 percent (38,000 acres) of the BLM surface decision area with an NSO stipulation or closed to fluid mineral leasing would reduce demand for new oil and gas-related ROWs in those areas compared with the BLM No Action Alternative.

Impacts from utility corridors would be the same as those under BLM Alternative B.

BIA Alternatives

Impacts Common to All BIA Alternatives

Under all BIA alternatives, impacts on lands and realty from managing areas as open to new ROW development would be the same as those described for the BLM No Action Alternative and in *Nature and Type of Effects* in the Environmental Consequences Supplemental Report, Section EC.5.4, Lands and Realty. In the BIA decision area, there would be no utility corridors or lands identified for sale, conveyance, acquisition, or exchange. Accordingly, there would be no impacts on lands and realty from the designation of utility corridors or land tenure adjustments.

Under all BIA alternatives, additional oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative.

BIA No Action Alternative

Prohibiting fluid mineral wells within 500 feet of any house or structure under the BIA No Action Alternative would continue to limit the placement of new oil and gas ROWs in the BIA surface decision area. Outside of the 500-foot setback area, impacts would be the same as those described in *BLM No Action Alternative*, above, for BLM management of areas open to leasing with standard terms and conditions.

BIA Alternative A

Under BIA Alternative A, prohibiting fluid mineral wells within 1,320 feet (0.25 miles) of any residential and community structures would reduce the portion of the BIA surface decision area where new ROWs could be developed compared with the BIA No Action Alternative. Outside of the 1,320-foot (0.25-mile) setback area, impacts on lands and realty would be the same as those described for the BLM No Action Alternative.

BIA Alternative B

Impacts would be the same as those described under BIA Alternative A.

BIA Alternative C

Impacts would be the same as those described under BIA Alternative A.

BIA Alternative D

Impacts would be the same as those under the BIA No Action Alternative.

Cumulative Impacts

Cumulative impacts on lands and realty would be the result of past, present, and reasonably foreseeable future actions that restrict the types or locations available for new ROWs, increase or decrease the demand for ROWs, designate utility corridors, or identify lands for retention, sale, conveyance, or exchange. Under all BLM and BIA alternatives, there would be increasing demand for new ROWs in the planning area because of existing and ongoing oil and gas activity. There would be the most demand for new ROW development in areas with the highest oil and gas potential. Over time, an expanded network of oil and gas infrastructure would incrementally increase the need to collocate new pipelines, power lines, and other ROWs with existing ROWs.

Within the BLM mineral decision area, there would be the fewest restrictions on ROW development under the BLM No Action Alternative and BLM Alternatives C and D. This is because those alternatives would manage the fewest acres as ROW avoidance and exclusion areas. Demand for new ROWs from oil and gas activity would be highest under the BLM No Action Alternative and BLM Alternative D because the BLM would manage the most acres as open to leasing with standard terms and conditions. BLM Alternatives A and B would manage comparatively more areas as ROW avoidance and exclusion areas. At the same time, however, there would be comparatively less demand for new ROWs because fewer areas would be open to oil and gas leasing. BLM Alternative D would result in similar cumulative impacts on lands and realty as

the BLM No Action Alternative, with the exception that slightly more of the BLM surface decision area would be managed as ROW avoidance or exclusion areas, and more areas would be open to leasing.

Designating utility corridors that follow existing infrastructure would allow future ROWs to collocate within the same corridor, which could increase the efficiency of installing, operating, and maintaining ROW infrastructure. Corridors would also decrease the potential for future impacts on lands and realty from infrastructure conflicts, for example intersecting ROWs, especially as the demand for oil and gas ROWs increases over time. The BLM No Action Alternative would provide the fewest opportunities to collocate infrastructure in corridors, while BLM Alternatives B, C, and D would provide the most. BLM Alternative A would provide fewer opportunities to collocate within corridors than BLM Alternatives B, C, and D, but more than the BLM No Action Alternative.

Within the BIA surface decision area, cumulative impacts on lands and realty would be similar to those described for the BLM, with the exception that stipulations limiting oil and gas development around buildings and cultural areas would limit opportunities for new ROWs in those areas. BIA Alternatives A, B, and C would preclude new ROWs in the most areas, while the BIA No Action Alternative and Alternative D would have less restrictive stipulations on oil and gas infrastructure. Outside the setback areas, ROWs and oil and gas leasing would be allowed, cumulatively affecting the lands and realty program by increasing the demand and associated opportunities for new ROWs. Additionally, BLM management that excludes or avoids ROWs on BLM-managed lands would increase the likelihood for new ROW development within the BIA surface decision area. BLM Alternatives B, C, and D, which include ROW avoidance and exclusion areas, would increase the potential for new ROW development to cumulatively affect BIA lands in the planning area.

There would be no cumulative impacts associated with utility corridors or land tenure on BIA-managed lands.

3.5.5 Recreation and Visitor Services

There are no decisions being considered that would significantly affect recreation areas and visitor services on BLM- and BIA-managed lands in the decision areas. BLM management of recreation SDAs would continue under the 2003 RMP. Hunting, fishing, and recreational shooting would not be affected by the alternatives considered in the FMG RMPA/EIS; therefore, these topics are not discussed in the FMG RMPA/EIS.

3.5.6 Wilderness

Affected Environment

Current Conditions and Trends

Current conditions for wilderness and previous wilderness study areas are described in the 2003 RMP (BLM 2003).

Environmental Consequences

BLM Alternatives

There are no BLM decisions being considered that would affect wilderness beyond the impacts analyzed in the 2003 RMP; therefore, impacts on wilderness from BLM alternatives are not discussed in the FMG RMPA/EIS.

BIA Alternatives

Impacts Common to All BIA Alternatives

The BIA administers 3,800 acres of Navajo Tribal trust and individual Indian allotment lands in the 44,700-acre Bisti/De-na-zin Wilderness Area, and 100 acres of Navajo Tribal trust lands in the 6,600-acre Ah-shi-sle-pah Wilderness Area. Since the authority to establish or release WSAs lies solely with Congress, no new WSAs will be established under any alternative.

The Resources Committee of the Navajo Nation Council has the authority to adopt rules and regulations for the operation of parks and recreation areas on the recommendation of the Parks and Recreation

Department and the Navajo Nation Parks Commission. This includes all areas of scenic beauty and scientific interest that require preservation (such as a wilderness area) and that are managed by the Navajo Nation in cooperation with other agencies (Navajo Nation Code 2009). These areas would not be considered designated wilderness subject to the mandates of the Wilderness Act, but they could be subject to other special management to protect wilderness quality. No areas in the BIA surface or mineral decision area have been designated by the Navajo Nation for special management for scenic beauty, such as wilderness. The FMG RMPA/EIS planning effort does not include management actions that specifically recommend preservation or development on BIA-managed lands for the Bisti/De-na-zin Wilderness Area or the Ah-shi-sle-pah Wilderness Area; therefore, wilderness would not be directly or indirectly affected by the BIA alternatives.

Cumulative Impacts

The area used to analyze cumulative impacts on the Ah-shi-sle-pah and Bisti/De-na-zin Wilderness Areas are BLM- and BIA-managed lands in the planning area. Trends described in the 2003 RMP, including increasing visitation and recreation in the area, continue to have potential to affect wilderness characteristics of the Ah-shi-sle-pah and the Bisti/De-na-zin Wilderness Areas (BLM 2003). In addition, development of coal or other energy and mineral resources next to the Ah-shi-sle-pah or Bisti/De-na-zin Wilderness Areas could affect perceived wilderness character.

As of February 2020, the Navajo Forestry Department is developing the Navajo Forestlands Integrated Resource Management Plan, which will integrate and guide the Navajo Nation's natural and cultural resource management activities in accordance with Tribal community values. This plan will outline the vision for the desired future state of its resources and establish goals, objectives, and strategies to achieve that future. It focuses on identifying the Nation's priorities for management and use and protection of its resources for the Navajo Forestland Areas (Navajo Forestry Department 2017). During this planning process, the Navajo Forestry Department will further analyze management and uses on the BIA-managed lands in the Bisti/De-na-zin and the Ah-shi-sle-pah Wilderness Areas and may consider management of areas of Navajo Tribal trust surface for scenic beauty, such as wilderness. If the forestry planning process changes management in designated wilderness, or if it identifies areas to be managed by the Navajo Nation for scenic beauty, such as wilderness, this could affect cumulative impacts on wilderness in the planning area.

3.6 SPECIALLY DESIGNATED AREAS

3.6.1 Specially Designated Areas

Affected Environment

The BLM currently manages 73 SDAs, which include ACECs and RNAs; archaeological protection sites; special status plant and animal species habitats; geological formations; fossil areas; riparian areas; wilderness; and wildlife areas. These are discussed in their respective resource sections. There are no new BLM SDAs being added or existing SDAs where the boundaries are being changed through the FMG RMPA/EIS process. **Figure 3-25**, BLM Areas of Critical Environmental Concern, shows the locations of the ACECs in the planning area. **Appendix K** includes more details about the existing ACECs.

The BIA does not manage any SDAs; however, the Navajo Nation does manage six designated wildlife areas. These areas are described in **Section 3.4.8**, Special Status and Listed Species.

Current Conditions

Recreation Management Areas

In 2013 and 2014, the FFO reallocated the 12 recreation SDAs identified in the 2003 RMP. This changed nine of the SDAs to SRMAs and the other three to ERMAs (BLM 2013, 2014c). Some of these recreation management areas are in the FMG RMPA/EIS planning area.

BIA Sensitive Areas

BIA sensitive areas are important cultural, archaeological, grazing, and wildlife areas, as well as CIMPPs. These areas are not defined with boundaries but exist throughout the planning area. The resources of interest in BIA sensitive areas are discussed generally throughout this chapter in their specific resource sections (**Sections 3.4.3**, Water Resources; **3.4.7**, Wildlife; **3.4.8**, Special Status and Listed Species; **3.4.9**, Cultural; **3.4.10**, Paleontological Resources; **3.4.11**, Visual; and **3.5.1**, Livestock Grazing).

Trends

Future management opportunities could include modifying the current management goals and objectives for the SDAs to further protect the areas' unique resource values, completing land tenure adjustments to acquire in-holdings in ACECs, and consolidating management objectives for some overlapping ACECs.

Environmental Consequences

The BLM alternatives, including the BLM No Action Alternative, do not create any new ACECs or change the boundary or management of existing ACECs. The total number of acres of ACECs in the decision area would not change under any alternative and would remain the same at 89,300 acres. The surface allocation of current ACECs would not change under any alternative. There may be impacts on the setting of an ACEC outside of the ACEC boundary, such as increased noise or light from development. None of the alternatives, however, would alter the relevant and important values for which these ACECs were designated, and they would continue to be managed following the specific management prescriptions outlined in the 2003 RMP; thus, there would be no impacts on ACECs under any BLM alternatives.

Impacts on other SDAs are described throughout this chapter, in **Section 3.4.7**, Wildlife; **Section 3.4.8**, Special Status and Listed Species; **Section 3.4.9**, Cultural Resources; **Section 3.4.10**, Paleontological Resources; and **Section 3.5.6**, Wilderness.

Impacts on specific resources protected by Navajo Nation sensitive areas are discussed in **Section 3.4.8**, Special Status and Listed Species. These are designated as highly sensitive areas, moderately sensitive areas, less sensitive areas, community development areas, biological preserves, and recreation areas. For this reason, impacts of BIA alternatives on SDAs are not further discussed in this section.

3.7 SOCIAL AND ECONOMIC CONDITIONS

3.7.1 Native American Tribal Interests and Uses

Affected Environment

The BLM and BIA have a trust responsibility to consult with Native American Tribes to identify their Indian trust assets (ITAs), cultural values, religious beliefs, and traditional practices that may be affected by actions on federal lands (see Affected Environment Supplemental Report, Section AE.5.1, Native American Interests and Uses). ITAs are legal interests in property that the United States, with the BIA as the responsible agency, holds in trust for recognized Indian Tribes or individual Indians, such as the individual Indian allotments. ITAs are defined as lands, natural resources, money, or other assets held by the federal government in trust or that are restricted against alienation for Indian Tribes and individual Indians (BIA 303, DM 2.5 C). These legal interests include Navajo allottee ownership of mineral and water rights, and part of the BIA's trust responsibilities are to protect and improve these ITAs.

Other Tribal resources or interests could include cultural resources, such as archaeological sites, as well as CIMPPs. As defined and described in greater detail in the glossary (**Appendix M**) and in the Affected Environment Supplemental Report, Section AE.2.9, Cultural Resources, and Section AE.5.1, Native American Interests and Uses, CIMPPs include a variety of resource types (including TCPs) that are generally distinguished because their significance lies in their importance to living communities, such as Tribes or Tribal individuals. Often Tribes view their relationships to CIMPPs as ongoing and of considerable significance, and traditional ceremonies, offerings, or pilgrimages at these CIMPPs can occur throughout the planning area but not always on fixed dates or times.

The BLM and BIA consult with Tribes, including the Navajo Nation, to identify CIMPPs before approving decisions or actions that could change land use, lands, resources, or access or that could alienate¹⁷ lands. The FFO also has a long history of consultation with the Navajo Nation on projects and issues that might affect its people or interests due in no small measure to the varied land status in the planning area. During the project's inception, the BLM initiated government-to-government consultation in writing with potentially interested Tribes and requested information on known CIMPPs or other locations of importance, and how best to evaluate the significance of these resources. This consultation is ongoing, and the introduction of the BIA as a co-lead agency for the project resulted in the BLM and BIA jointly sending additional consultation letters in December 2017 to 34 Tribes (see Affected Environment Supplemental Report, Section AE5.1, Native American Interests and Uses).

The presence and significance of CIMPPs or other Tribal resources or practices would be determined through consultation with Tribes, while recognizing that information about some CIMPPs could be privileged and confidential, and therefore unavailable for inclusion in the NEPA analysis. Additionally, the Navajo Nation's Traditional Cultural Program maintains records of previously published CIMPPs that are of significance to the entire Navajo Nation, while other CIMPPs in the planning area may be of significance to local Navajo communities, families, and individuals. In contrast, the significance of ITAs, such as water and fluid mineral rights for the Navajo Nation and Navajo allottees, is more clearly identifiable.

Current Conditions

Tribal interests and CIMPPs are identified primarily during the Section 106 process and through consultation with federally recognized Indian Tribes on a government-to-government basis. As detailed in the Affected Environment Supplemental Report, Section AE.5.1, Native American Interests and Uses, Tribal leaders and historians generally view the process of consultation in its entirety as one in which representatives of sovereign nations meet to discuss and resolve potential conflicts, with issues often centering on the protection of landscapes and places.

There are no ITAs on the BLM-managed land; however, such lands are close to trust and fee lands of the Navajo Nation. Key ITAs on Navajo Tribal trust lands and individual Indian allotments in the planning area are rights for water, fluid minerals, and grazing. The BIA has trust responsibilities for these ITAs to protect and help develop them for the benefit of the Navajo Nation on trust lands or individual Indian allottees on allotment lands, as exemplified by BIA leasing stipulations to benefit the Navajo Nation or individual Indian allottees.

Previous consultation has identified nearly 500 CIMPPs in the BLM-managed portion of the planning area (BLM GIS 2017), and NNHHPD records show there are 82 CIMPPs on the BIA-managed lands in the Navajo Nation portion of the planning area. As a result of scoping, Tribes have indicated there are other CIMPPs and Tribal resources in the planning area and requested that these resources be considered during the amendment process. Further, some of these CIMPPs may be archaeological sites or other cultural resources (**Section 3.4.9**, Cultural Resources), and their significance is specific to the Tribal group that considers them important.

Trends

Based on the current condition of Tribal ITAs and CIMPPs, there are several trends to note. The rate of identification of CIMPPs has increased in concert with oil and gas and other development. These actions have resulted in increased consultation with Tribes and has sometimes led to Tribes identifying more CIMPPs or other Tribal resources. Just as the trends of changing conditions for Tribal resources and CIMPPs are difficult to determine from permitted activities, the impacts of unpermitted activities on these properties are more difficult to determine.

¹⁷ Legal term meaning to transfer landownership to another person or group

Environmental Consequences

BLM Alternatives

Impacts Common to All BLM Alternatives

As described in greater detail in Environmental Consequences Supplemental Report, Section EC.5.1, Native American Interests and Uses, there is the potential for physical, visual, auditory, and vibratory impacts on Native American ITAs and CIMPPs with each phase of fluid mineral development from planning, leasing, and an APD, which are considered separate undertakings. The Advisory Council on Historic Preservation (ACHP) has acknowledged that the early phases of fluid mineral development such as leasing (or planning) have the potential to affect historic properties and CIMPPs important to Native Americans (ACHP 2016, 2017, 2018). The ACHP has also acknowledged that a phased approach to Section 106 of the NHPA is reasonable and in good faith, provided the agencies complete all appropriate Section 106 efforts (identifying historic properties, assessing effects, and consulting with agencies, Tribes, and other parties) for each phase, which are considered separate undertakings.

The agencies' understanding of how Native American ITAs and CIMPPs could be impacted by fluid mineral development increases in specificity at each stage and separate undertaking (planning—leasing—APD) through the relevant Section 106 and NEPA processes and consultation with Tribes as more detail is known about the locations of proposed development.

Under all the BLM alternatives, fluid mineral leasing and subsurface development in CSU and NSO areas could result in visual, auditory, or vibratory impacts on CIMPPs and diminish the ability of Tribes to conduct ceremonies or otherwise use these CIMPPs, which could affect the mental well-being of certain Tribal members, as described by Begay (2001).

BLM No Action Alternative

Vegetation Management, Lands with Wilderness Characteristics, and Lands and Realty

Under the BLM No Action Alternative, vegetation treatments in game management units would not be prioritized to protect CIMPPs, and no areas would be managed to protect wilderness characteristics as a priority over other multiple uses. Therefore, vegetation management and lands with wilderness characteristics would not affect impacts on Native American Tribal interests and uses. There would be no ROW exclusions or avoidance in the BLM surface decision area. Instead, ROW authorizations would continue to be managed on a case-by-case basis. The BLM could use its discretion to locate ROWs as needed to protect Native American Tribal interests.

Fluid Minerals

Under the BLM No Action Alternative, fluid mineral leasing and exploration would be allowed on roughly 95 percent of the BLM mineral decision area, and As detailed in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), the BLM No Action Alternative would allow 737,700 acres to be open to leasing with standard terms and conditions, 83,800 acres would be managed with NSO stipulations, 1,112,600 acres would be managed with CSU stipulations, and 316,300 acres would be managed with TL stipulations. The areas with the greatest potential for impacts on Native American Tribal interests and uses from fluid mineral development are those managed with standard lease terms and conditions, with decreasing potential for impacts in areas managed with NSO, CSU, and TL stipulations.

Where surface occupancy for fluid mineral leasing and development is allowed under the BLM No Action Alternative, there is the potential for physical impacts that diminish the historic and physical integrity of CIMPPs. Areas allowing surface occupancy also create the potential for visual, auditory, or vibratory impacts on the qualities that make CIMPPs significant to Tribes or eligible to the NRHP. There would be fewer impacts on CIMPPs in CSU areas (depending on the type or extent of restriction on the surface use).

Under the BLM No Action Alternative, there are also 79 ACECs (encompassing approximately 78,700 acres) that are managed to limit impacts on cultural resources from such uses as fluid mineral development (BLM 2003).

Impacts Common to all BLM Action Alternatives

Under all BLM action alternatives, stipulations related to vegetation would allow for gathering and cutting of woody species in a riparian area when an exception is granted for traditional uses, such as ceremonial gathering of sacred plants at a CIMPP. The BLM would restrict vegetation treatments in areas of known sacred or medicinal plant gathering CIMPPs, with exceptions that may be granted for traditional plant gathering areas that have invasive plants. Further, as part of the Section 106 process of the NHPA, the BLM would consult with Tribes with cultural affinity for CIMPPs to avoid or minimize impacts on these types of resources, such as traditional plant gathering and offering areas or sacred viewsheds. The BLM also would consult with Tribes and the public, as appropriate, before any vegetation treatments would occur on or near CIMPPs.

In addition, the BLM would consider allowing the exchange of unleased lands with the NPS within 1 mile of the CCNHP (approximately 1,200 acres), plus an additional 2,200 acres to the northeast of the CCNHP, for a total of 3,400 acres in consideration of avoiding or minimizing impacts on Chacoan sites (some Tribes claim cultural affiliation with these sites and are evaluated in this analysis as CIMPPs), as described in Public Law 96-550. This vegetation and land tenure management under BLM Alternative A, which is also included in BLM Alternatives B, C, and D, would result in fewer impacts on CIMPPs when compared with the BLM No Action Alternative.

BLM Alternative A

Vegetation Management, Lands with Wilderness Characteristics, and Lands and Realty

Under BLM Alternative A, the BLM would allow no leasing of lands with wilderness characteristics (24,300 acres), which would result in fewer impacts on CIMPPs and ITAs when compared with the BLM No Action Alternative. Vegetation treatments in game management units would not be prioritized to protect CIMPPs; therefore, vegetation management would not affect impacts on Native American Tribal interests and uses.

Under its Alternative A, the BLM would manage certain areas to exclude oil and gas ROWs, including a 4-mile zone around the CCNHP, the areas within 3 miles of Chacoan outliers and roads (including those within and outside of ACECs), and areas within 1,312 feet (0.25 miles) of any structures (e.g., houses, barns, structures on home site leases, or other community, municipal, and public buildings, some of which may be CIMPPs).

BLM Alternative A would also include ROW avoidance within 0.7 miles of CIMPPs. The BLM would avoid placing utility corridors within 3 miles of Chacoan roads or great houses or crossing or paralleling known Chacoan roads (including those within and outside ACECs). Further, there would be ROW avoidance areas within 656 feet (200 meters) of all 100-year floodplains, riparian systems, wetlands, seeps, or springs.

As compared with the BLM No Action Alternative, which lacks comparable management, the land and realty stipulations under BLM Alternative A would result in less potential for physical impacts on CIMPPs and ITAs. They also would reduce visual, auditory, or vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling. The BLM could further reduce impacts by using its discretion to locate ROWs to avoid these resources.

Fluid Minerals

In the BLM mineral decision area, the BLM would allow 1,439,200 acres to be open to leasing under BLM Alternative A, as compared with 1,874,300 acres under the BLM No Action Alternative. Additionally, the BLM would not allow leasing of 542,900 acres, which is 5 times less area open to leasing than under the BLM No Action Alternative. This reduction in areas open to leasing under BLM Alternative A, when compared with the BLM No Action Alternative, would result in less potential for physical impacts on CIMPPs or ITAs.

Under its Alternative A, the BLM would not allow fluid mineral leasing in a 2-mile zone around the CCNHP and Chacoan outlier sites or roads, including within and outside of ACECs. Further, the areas within 2 miles of Cutter and Navajo Reservoirs—both important water-related ITAs for the Navajo Nation—would be closed to leasing; as existing leases in these areas expire, the leases would not be renewed. These fluid mineral leasing closures under BLM Alternative A would result in less potential for physical impacts on CIMPPs and ITAs or visual, auditory, and vibratory impacts that could reduce integrity in setting or feeling.

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), when compared with the BLM No Action Alternative, under BLM Alternative A the areas open to leasing with standard terms and conditions would decrease by 67 percent, areas with NSO stipulations would increase by 12 times (1,138 percent), and areas with CSU stipulations would decrease by 37 percent. NSO stipulations related to Native American Tribal interests under BLM Alternative A include the areas from 2 to 4 miles outside the CCNHP and from 2 to 3 miles of Chacoan outliers and roads (including those within and outside of ACECs). BLM Alternative A would include NSO stipulations within 0.7 miles of CIMPPs and within 1,000 feet of certain water-related features or elements of ITAs, such as domestic water wells and community water sources. Another NSO stipulation under BLM Alternative A would include the area 656 feet (200 meters) around active channels, 100-year floodplains, wetlands, seeps, and springs.

As compared with the BLM No Action Alternative, these fluid mineral leasing NSO stipulations under BLM Alternative A would result in less potential for physical impacts on CIMPPs and ITAs, and they would reduce visual, auditory, or vibratory impacts that could diminish aspects of the historical integrity, such as setting or feeling.

BLM Alternative B (Includes BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

Vegetation Management, Lands with Wilderness Characteristics, and Lands and Realty

Under its Alternative B, the BLM would allow no leasing of lands with wilderness characteristics (24,300 acres), and certain game management units would also include vegetation treatments focused on managing for CIMPPs. This management under BLM Alternative B would result in less potential for impacts on CIMPPs when compared with the BLM No Action Alternative, which includes no similar management.

Under its Alternative B, the BLM would manage certain areas to exclude oil and gas ROWs, including a 10-mile zone around the CCNHP. Operators developing wells within 10 miles of the CCNHP would be required to use remote telemetry for well monitoring, liquid gathering systems, and off-site facilities. Oil and gas or transmission line (greater than 115 kV) ROW exclusions include the areas within 5 miles of Chacoan outliers and roads, including Chacoan ACECs, Chaco protection sites, and World Heritage sites.

BLM Alternative B would also include ROW avoidance within 1.6 miles of CIMPPs and 150 feet of all 100-year floodplains, riparian systems, wetlands, seeps, or springs. Additionally, the BLM would avoid placing utility corridors within 5 miles of Chacoan roads or great houses or crossing or paralleling known Chacoan roads (including those within and outside ACECs).

As compared with the BLM No Action Alternative, which lacks comparable management, the ROW avoidance and exclusion areas under BLM Alternative B would result in less potential for physical impacts on CIMPPs and ITAs. They also would reduce visual, auditory, or vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling. The BLM could further reduce impacts by using its discretion to locate ROWs to avoid these resources.

Fluid Minerals

BLM Alternative B would also include NSO stipulations within 150 feet around all 100-year floodplains, riparian systems, wetlands, seeps, and springs. Under BLM Alternative B, there would be a CSU stipulation within 1,000 feet of all domestic water wells or community water sources, and 500 feet from 100-year floodplains, riparian systems, wetlands, seeps, and springs.

BLM Sub-Alternative B1

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), the areas closed to leasing by BLM in their mineral decision area under BLM Sub-Alternative B1 would increase by 566 percent when compared with the BLM No Action Alternative. This increase in areas closed to leasing under BLM Sub-Alternative B1, when compared with the BLM No Action Alternative, would result in fewer physical impacts on CIMPPs or ITAs.

Under BLM Sub-Alternative B1, the BLM would not allow fluid mineral leasing in a 10-mile zone around the CCNHP. Further, the areas within 2 miles of Cutter and Navajo Reservoirs—both important water-related ITAs for the Navajo Nation—would be closed to leasing; as existing leases in these areas expire, the leases would not be renewed. These fluid mineral closures under BLM Sub-Alternative B1 would result in less potential for physical impacts on CIMPPs and ITAs or visual, auditory, or vibratory impacts that could reduce integrity in setting or feeling.

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), when compared with the BLM No Action Alternative, under BLM Sub-Alternative B1 the areas open to leasing with standard terms and conditions would decrease by 74 percent, areas with NSO stipulations would increase by 602 percent, and areas with CSU stipulations would decrease by 20 percent. NSO stipulations related to Native American interests and uses under BLM Sub-Alternative B1 include the areas from 0 to 10 miles outside the CCNHP, 3 to 5 miles of Chacoan outliers and roads (including those within and outside of ACECs), and 1.6 miles from CIMPPs.

Within the closure from 0 to 10 miles outside the CCNHP, existing leases would be fully developed before the BLM would consider leasing additional fluid minerals in this zone, and any operator would have to submit a master development plan (MDP) showing how they would reduce impacts on the CCNHP, CIMPPs (including the Navajo concept of *Yádiłhił*), and dark skies.

As compared with the BLM No Action Alternative, these fluid mineral leasing stipulations under BLM Sub-Alternative B1 (particularly the closures and NSO stipulations) would result in less potential for physical impacts on CIMPPs and ITAs, and they would reduce visual, auditory, or vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling.

BLM Sub-Alternative B2

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), the areas closed to leasing by BLM in their mineral decision area under BLM Sub-Alternative B2 would increase by 656 percent when compared with the BLM No Action Alternative. This increase in areas closed to leasing under BLM Alternative B, when compared with the BLM No Action Alternative, would result in fewer physical impacts on CIMPPs or ITAs.

Under BLM Sub-Alternative B2, the BLM would not allow fluid mineral leasing in a 15-mile zone around the CCNHP. Further, the areas within 2 miles of Cutter and Navajo Reservoirs—both important water-related ITAs for the Navajo Nation—would be closed to leasing; as existing leases in these areas expire, the leases would not be renewed. These fluid mineral closures under BLM Alternative B would result in less potential for physical impacts on CIMPPs and ITAs or visual, auditory, or vibratory impacts that could reduce integrity in setting or feeling.

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), when compared with the BLM No Action Alternative, under BLM Sub-Alternative B2 the areas open to leasing with standard terms and conditions would decrease by 75 percent, areas with NSO stipulations would increase by 554 percent, and areas with CSU stipulations would decrease by 26 percent.

Within the closure zone from 0 to 15 miles outside the CCNHP, existing leases would be fully developed before the BLM would consider leasing additional fluid minerals in this zone, and any operator would have

to submit an MDP showing how they would reduce impacts on CCNHP, CIMPPs (including the Navajo concept of Yádiłhił), and dark skies.

As compared with the BLM No Action Alternative, these fluid mineral leasing stipulations under BLM Sub-Alternative B2 (particularly the closures and NSO stipulations) would result in less potential for physical impacts on CIMPPs and ITAs, and they would reduce visual, auditory, or vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling.

BLM Alternative C (Includes BLM Sub-Alternatives C1–C6; applying only to Fluid Minerals)

Vegetation Management, Lands with Wilderness Characteristics, and Lands and Realty

Under BLM Alternative C, certain game management units would include vegetation treatments focused on managing for traditional plant uses and CIMPPs. These treatments under BLM Alternative C would result in fewer impacts on CIMPPs and ITAs when compared with the BLM No Action Alternative, which includes no similar management.

As compared with the BLM No Action Alternative, which lacks comparable ROW management, the lands and realty stipulations under BLM Alternative C would result in slightly less potential for physical impacts on CIMPPs and ITAs. They also would reduce visual, auditory, or vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling. The BLM could further reduce impacts by using its discretion to locate ROWs to avoid these resources.

Fluid Minerals

NSO stipulations under BLM Alternative C that are not mapped and relate to CIMPPs include 1 mile outside Chacoan outliers, 0.7 miles around CIMPPs, 0.75 miles on either side of Chacoan roads that are not within ACECs, and 0.5 miles on either side of the boundary for Chacoan road ACECs, including the North Road and Ah-shi-sle-pah Road ACECs. BLM Alternative C also would include NSO stipulations within 1,000 feet of domestic water wells or community water sources.

As compared with the BLM No Action Alternative, fluid mineral leasing stipulations that are not mapped under BLM Alternative C would result in less potential for physical impacts on CIMPPs and ITAs. They also would reduce visual, auditory, or vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling.

BLM Alternative C includes six sub-alternatives that propose varied fluid mineral leasing management, as described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres). The varied management particularly changes in the proximity of the CCNHP with mapped fluid mineral leasing stipulations. For example, BLM Sub-Alternatives C1 to C5 respectively include NSO stipulations around the CCNHP from miles 0-2, miles 0-4, miles 0-6, miles 0-8, and miles 0-10, and BLM Sub-Alternative C6 proposes a fluid mineral leasing closure from miles 0-4 and NSO stipulations from miles 4-6. The mapped fluid mineral leasing stipulations are described by each BLM Alternative C sub-alternative below, and the unmapped fluid mineral stipulations that apply to all of BLM Alternative C are described thereafter.

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), the areas closed to leasing by BLM in their mineral decision area under BLM Sub-Alternatives C1–C5 would remain the same as the BLM No Action Alternative, while the areas closed to leasing would decrease by 2 percent for BLM Sub-Alternative C6. This management would result in similar potential for physical impacts on CIMPPs or ITAs as under the BLM No Action Alternative.

BLM Sub-Alternative C1

When compared with the BLM No Action Alternative, the acreage open for leasing under standard terms and conditions under BLM Sub-Alternative C1 would be reduced by 7 percent, and areas with NSO stipulations would increase by 60 percent. Because areas with NSO stipulations for fluid mineral leasing would increase while areas open for leasing with standard terms would decrease, BLM Sub-Alternative C1

could result in a lower potential for impacts on cultural resource when compared with the BLM No Action Alternative. As noted in the *Impacts Common to All BLM Alternatives*, even though the NSO stipulations under BLM Sub-Alternative C1 (and the NSO stipulations proposed under the other BLM Alternative C sub-alternatives) would result in fewer impacts on cultural resources, fluid mineral leasing and subsurface development in NSO areas could result in visual, auditory, or vibratory impacts on CIMPPs and diminish the ability of Tribes to conduct ceremonies or otherwise use these CIMPPs, which could affect the mental well-being of certain Tribal members, as described by Begay (2001).

BLM Sub-Alternative C2

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C2 would be reduced by 10 percent, and areas with NSO stipulations would increase by 93 percent. Given the increase in areas with NSO stipulations for fluid mineral leasing and decrease in areas open for leasing with standard terms, BLM Sub-Alternative C2 could result in a lower potential for impacts on cultural resource when compared with the BLM No Action Alternative. Overall, the types of impacts under BLM Sub-Alternative C2 would be similar to those described under BLM Sub-Alternative C1.

BLM Sub-Alternative C3

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C3 would be reduced by 14 percent, and areas with NSO stipulations would increase by 133 percent. Because areas with NSO stipulations for fluid mineral leasing would increase while areas open for leasing with standard terms would decrease, BLM Sub-Alternative C3 could result in a lower potential for impacts on cultural resource when compared with the BLM No Action Alternative. Overall, the types of impacts under BLM Sub-Alternative C3 would be similar to those described under BLM Sub-Alternative C1.

BLM Sub-Alternative C4

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C4 would be reduced by 19 percent, and areas with NSO stipulations would increase by 188 percent. Given the increase in areas with NSO stipulations for fluid mineral leasing and decrease in areas open for leasing with standard terms, BLM Sub-Alternative C4 could result in a lower potential for impacts on cultural resource when compared with the BLM No Action Alternative. Overall, the types of impacts under BLM Sub-Alternative C4 would be similar to those described under BLM Sub-Alternative C1.

BLM Sub-Alternative C5

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C5 would be reduced by 24 percent, and areas with NSO stipulations would increase by 253 percent. Because of these changes to areas open to fluid mineral leasing with standard terms and conditions or NSO stipulations, BLM Sub-Alternative C5 could result in a lower potential for impacts on cultural resource when compared with the BLM No Action Alternative. Overall, the types of impacts under BLM Sub-Alternative C4 would be similar to those described under BLM Sub-Alternative C1.

BLM Sub-Alternative C6

When compared with the BLM No Action Alternative, the areas closed to leasing under BLM Sub-Alternative C6 decreases by 2.4 percent due to a leasing closure from 0-2 miles around the CCNHP. Additionally, the areas open to fluid mineral leasing with standard terms and conditions under BLM Sub-Alternative C6 would be reduced by 14 percent, and areas with NSO stipulations would increase by 87 percent. Because of these changes to areas open to fluid mineral leasing, including those areas open to fluid mineral leasing with standard terms and conditions or NSO stipulations, BLM Sub-Alternative C6 could result in a lower potential for impacts on cultural resource when compared with the BLM No Action Alternative. Overall, the types of impacts under BLM Sub-Alternative C6 would be similar to those described under BLM Sub-Alternative C1.

BLM Alternative D

Vegetation Management, Lands with Wilderness Characteristics, and Lands and Realty

Under BLM Alternative D, vegetation treatments in game management units would not be prioritized to protect CIMPPS, and no areas would be managed to protect wilderness characteristics as a priority over other multiple uses. Therefore, vegetation management and lands with wilderness characteristics would not affect impacts on Native American Tribal interests and uses.

As compared with the BLM No Action Alternative, which lacks comparable ROW management, the ROW management under BLM Alternative D would result in similar, or slightly less, potential for physical impacts on CIMPPs and ITAs, or visual, auditory, or vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling.

Fluid Minerals

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), the areas proposed as open or closed to leasing by the BLM in its mineral decision area under Alternative D are the same as under the BLM No Action Alternative. Under BLM Alternative D, the potential for physical impacts on CIMPPs and ITAs or visual, auditory, and vibratory impacts that could reduce integrity in setting or feeling, would therefore be similar to that under the BLM No Action Alternative.

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), under BLM Alternative D the areas open to leasing with standard terms and conditions would increase by 4 percent, areas with NSO stipulations would decrease by 51 percent, and areas with CSU stipulations would decrease by 3 percent when compared with the BLM No Action Alternative. As compared with the BLM No Action Alternative, these fluid mineral leasing stipulations under BLM Alternative D would result in similar, or less, potential for physical impacts on CIMPPs or visual, auditory, or vibratory impacts that could diminish aspects of historical integrity, such as setting or feeling.

BIA Alternatives

Impacts Common to All BIA Alternatives

As described above in *Impacts Common to All BLM Alternatives* and in greater detail in Environmental Consequences Supplemental Report, Section EC.2.9, Cultural Resources, there is the potential for physical and indirect impacts on cultural resources with each phase of fluid mineral development from planning, leasing, and an APD. Under all BIA alternatives, the BIA would continue its mandate to protect and improve the Navajo Tribal trust and individual Indian allotment lands, including the potential leasing of fluid minerals on lands such as those individual Indian allotments within or near the boundaries of the CCNHP. Fluid mineral leasing in the areas near the CCNHP under all alternatives would not infringe Navajo Nation Tribal sovereignty and self-determination for allottees to develop their lands in the manner they deem appropriate. Fluid minerals owned by Tribes or allottees are ITAs, and because fluid mineral leasing and exploration would be allowed on all 593,460 acres of the BIA mineral decision area under all alternatives, there would be no impacts on these ITAs. Under all BIA alternatives, however, fluid mineral leasing within or near the boundaries of the CCNHP has the potential for physical, visual, auditory, or vibratory impacts on CIMPPs in these areas, such as diminishment of physical integrity or historical integrity (e.g., setting, feeling, or association, or significance to a Tribe), or a reduction in the ability of Tribes to conduct ceremonies or otherwise use CIMPPs. This could affect the mental well-being of certain Tribal members, as described by Begay (2001).

Under all BIA alternatives, additional surface disturbance from oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative. Otherwise, the type of impacts common under all BIA alternatives would be the same as those described under the impacts common under the BLM alternatives.

BIA No Action Alternative

Under the BIA No Action Alternative, fluid mineral leasing and exploration would be allowed on all of the 593,460 acres (383,200 acres and 210,260 acres, respectively, of Navajo Tribal trust and individual Indian allotment minerals) of the BIA mineral decision area. Surface occupancy for fluid mineral leasing and exploration would be allowed on most of the 885,460 acres (657,360 acres and 210,106 acres, respectively, of Navajo Tribal trust and individual Indian allotment minerals) of the BIA surface decision area. The BIA surface decision area open to surface occupancy for fluid mineral leasing and exploration would include the 828,600 acres (94 percent) of low sensitivity, moderate sensitivity, and community development areas identified in the Navajo Nation Department of Wildlife (NNDFW) Biological Resource Land Use Clearance Policies and Procedures (RCP), but would generally not include the 50,400 acres (6 percent) of high sensitivity, biological preserves, and recreation areas described in the RCP.

Surface occupancy for fluid mineral leasing and development is the least restricted in the RCP's low sensitivity, moderate sensitivity, and community development areas, and therefore has the greatest potential for physical impacts on Native American Tribal interests and uses under the BIA No Action Alternative. In contrast, the RCP's high sensitivity, biological preserves, and recreation areas have the most potential restrictions on surface occupancy for fluid mineral leasing and development, and therefore the potential for fewer impacts under the BIA No Action Alternative. These potential physical impacts include diminishing the historic and physical integrity of CIMPPs.

Areas allowing surface occupancy also create the potential for visual, auditory, or vibratory impacts on the qualities that make CIMPPs significant to Tribes or eligible for listing on the NRHP. Fluid mineral leasing and subsurface development could have visual, auditory, or vibratory impacts on CIMPPs and diminish the ability of Tribes to conduct ceremonies or otherwise use these cultural resources (Begay 2001).

Under the BIA No Action Alternative, leasing stipulations specify that the Navajo Nation's rights to water and water-related ITAs would not be impaired; therefore, these resources would not be affected.

BIA Alternative A

Under this alternative, there would be stipulations related to fluid minerals and Native American Tribal interests and uses that continue the current management under the BIA No Action Alternative and would require lessees to comply with all applicable federal and Tribal laws and regulations; therefore, the type of impacts on Native American Tribal interests and uses for continuing this current management would be the same under BIA Alternative A as under the BIA No Action Alternative.

Otherwise, when compared with the BIA No Action Alternative, fluid mineral lease stipulations under BIA Alternative A reflect a tiered approach to the Section 106 process (as discussed above in *Impacts Common to All BLM Alternatives* regarding recent ACHP opinions) where identification of CIMPPs would include the area of potential effects identified at the site-specific APD level. The stipulations under this alternative would also require that the Navajo Nation THPO consult with local communities and the Navajo Chapter regarding CIMPPs and the proposed leases. The tiered approach to the Section 106 process under this alternative, and the consultation requirement for the Navajo Nation THPO, meet the "reasonable and good faith" identification standard discussed by the ACHP (ACHP 2018) and would reduce impacts on CIMPPs when compared with the BIA No Action Alternative.

A stipulation under this alternative would also require lessees to set back fluid mineral wells at least 1,320 feet (0.25 miles) from CIMPPs on both Navajo Tribal trust and individual Indian allotment lands. This could reduce the potential for indirect impacts on the setting or feeling of CIMPPs from fluid mineral leasing, as the current lease stipulations under the BIA No Action Alternative require fluid mineral wells to be set back at least 500 feet from structures on Navajo Tribal trust land and at least 200 feet on individual Indian allotment land.

Under BIA Alternative A, leasing stipulations would continue the current management of the BIA No Action Alternative that the Navajo Nation's rights to water and water-related ITAs would not be impaired. They would further specify that lessees would not use any waters of the Navajo Nation or drill any water wells without a water use permit from the NNWCA. Water-related ITAs would therefore not be affected under this alternative.

BIA Alternative B

The types of impacts under BIA Alternative B would be the same as those described under BIA Alternative A. Otherwise, a stipulation under this alternative would require directional drilling for fluid minerals to limit the visibility of proposed well locations from CIMPPs or culturally sensitive viewpoints. These locations may not be on a proposed lease and would be defined through consultation with the BIA, Navajo Nation, other Tribes with CIMPPs in the viewshed, and local communities. This would limit the potential for visual, auditory, or vibratory impacts on historic properties or CIMPPs under BIA Alternative B, when compared with the BIA No Action Alternative.

Additionally, under this alternative, a fluid mineral leasing stipulation to limit light pollution at key cultural resources identified by the NPS, Navajo Nation, or other Tribes, which could include CIMPPs. This stipulation would limit the potential for visual impacts on CIMPPs when compared with the BIA No Action Alternative. Another stipulation under BIA Alternative B would keep nighttime noise levels below 35dBA at the CCNHP and Chacoan outlier sites—some of which may be CIMPPs for Tribes—and would also limit the potential for auditory impacts on CIMPPs when compared with the BIA No Action Alternative.

BIA Alternative C

The type of impacts under BIA Alternative C would be the same as those impacts described under BIA Alternative B. Otherwise, fluid mineral leasing stipulations under this alternative to protect CIMPPs (including the Navajo concept of *Yádiłhił*), as well as keep nighttime noise levels below 35 dBA at CIMPPs, would limit the potential for visual and auditory impacts on CIMPPs when compared with the BIA No Action Alternative.

BIA Alternative D

Under this alternative, there would be leasing stipulations related to fluid minerals and cultural resources that continue the current management under the BIA No Action Alternative. They would require lessees to comply with all applicable federal and Tribal laws and regulations. Stipulations under BIA Alternative D would continue the current lease stipulations under the BIA No Action Alternative, which require fluid mineral wells to be set back at least 500 feet from structures on Navajo Tribal trust land and at least 200 feet on individual Indian allotment land; therefore, the impacts on cultural resources for continuing this current management would be the same under BIA Alternative D as under the BIA No Action Alternative.

Stipulations under this alternative that relate to the tiered approach to Section 106 described by the ACHP (ACHP 2018) are the same as those described under BIA Alternatives A, B, and C; therefore, the impacts would be the same. This approach would reduce impacts on CIMPPs when compared with the BIA No Action Alternative.

In addition, a stipulation under this alternative to limit light pollution from fluid mineral development and operations (for example, from flaring) would limit the potential for visual impacts on CIMPPs when compared with the BIA No Action Alternative.

Cumulative Impacts

The cumulative impacts analysis area for Native American interests and uses includes the entire planning area regardless of surface or mineral ownership. Past and present actions that have had, or are having, physical impacts (for example, damaging or destroying the physical integrity of certain resources) and visual, auditory, or vibratory impacts (e.g., reducing a property's historical integrity or reducing the ability of a Tribe to use a CIMPP) on Native American interests and uses include activities such as mineral and infrastructure development, agriculture and grazing, residential and commercial development, travel off designated routes,

wildfire, and recreation. Reasonably foreseeable future actions with the potential to affect Native American interests and uses are similar to the past and present actions.

Management under the BLM and BIA alternatives would contribute to cumulative impacts on Native American interests and uses in the planning area. Oil and gas exploration, leasing, and development or ROW authorization in the BLM and BIA decision areas could result in potential physical, visual, auditory, or vibratory impacts on ITAs' or CIMPPs' physical integrity or setting and feeling from increased traffic, dust, noise, and light pollution.

Proposed management under BLM Alternatives A and B would be the most restrictive toward oil and gas development, which would reduce the contribution to cumulative impacts on Native American interests and uses in the planning area (**Appendix I, Table 4-1**, Estimated Number of Wells and Associated Disturbance, Production, and Water Use, 2018–2037). The potential contribution to cumulative impacts on Native American interests and uses would be increased under BLM Alternative C; however, the highest potential contributions to impacts on Native American interests and uses would occur under the BLM No Action Alternative and BLM Alternative D because of the greater amount of surface disturbance projected under these alternatives (**Appendix I, Table 4-1**).

Proposed management under BIA Alternatives A and B would be the most restrictive toward oil and gas development, which would reduce the contribution to cumulative impacts on certain Native American interests and uses in the planning area, except for fluid mineral ITAs (**Appendix I, Table 4-1**). Under BIA Alternative C, there would be the least potential contribution to cumulative impacts on Native American interests and uses, except for fluid mineral ITAs. The highest potential contributions to impacts would occur under the BIA No Action Alternative and BIA Alternative D because of the greater amount of surface disturbance projected under these alternatives (**Appendix I, Table 4-1**).

3.7.2 Social and Economic Uses

Affected Environment

This section includes an overview of data used during analyses of social and economic activities in the planning area. The full report, including current conditions, trends, population and migration, housing, income distribution and poverty level, jobs and employment, public services, fiscal conditions, local economic activity, market and commodity values, nonmarket values, and ecosystem services, is provided in the Affected Environment Supplemental Report, Section AE.5.2, Social and Economic Uses.

The BLM and BIA collected information for the counties and the state from Headwaters Economics' Economic Profile System (Headwaters Economics 2017), the US Census Bureau, the US Bureau of Economic Analysis (BEA), and the US Bureau of Labor Statistics.

When possible, data for Native American Tribes in the planning area are included, along with county and state data for comparison. These are most commonly American Community Survey (ACS) data and not necessarily previous census data or other data sources. (Note that Native American survey and census participation rates tend to be lower than for other populations, potentially skewing the data collected.)

Because data are generally available at the county level, current conditions for socioeconomic conditions for BIA- and BLM-managed lands are addressed together. Fiscal, market, and commodity contributions specific to the BIA or relevant Tribal nations and the BLM are discussed separately as appropriate in the respective sections. (Note that, following US Census Bureau datasets [US Census Bureau 2010, 2015] unless otherwise specified, data for Tribal nations are representative of the Tribal reservation and all off-reservation lands; they are not specific to the portion in the planning area). Data for relevant Navajo Nation Chapters is included where available and appropriate.

Detailed data and a discussion of conditions and trends are provided in the FFO socioeconomic baseline report prepared in coordination with the FMG RMPA/EIS (BLM 2014d). Data in the Affected Environment

Supplemental Report, Section AE.5.2, Social and Economic Uses have been updated from that provided in the 2014 report, where available and appropriate to reflect the best available information.

Environmental Consequences

BLM Alternatives

Impacts Common to All BLM Alternatives

Economic impacts from development would likely be spread through the region, as labor and services would be drawn from throughout the four-county area and beyond. The local labor force for drilling and completion, as well as production, would likely be drawn from those currently employed in the mineral development industry, those unemployed, and potentially, those relocating on a temporary or permanent basis to the planning area. Employment changes resulting from this development may contribute to the goals outlined in Executive Order 13790, Promoting Agriculture and Rural Prosperity in America (82 FR 20237-20239).

Impacts that vary based on the distance from a well site would be more directly linked with site-specific areas of development. These impacts would include the potential for impacts on property value, as well as impacts on social setting from development activities, including but not limited to noise (see discussion in section 3.4.12) and visual impacts (see discussion in section 3.4.11). The location and intensity of these impacts would depend on the exact location and timing of development, which cannot be determined in this planning process. Based on the 2019 RFD scenario (**Appendix I**), however, it is likely that the most concentrated level of development for all alternatives would occur surrounding the communities of Nageezi and Counselor in San Juan and Sandoval Counties, respectively. As a result, the described impacts could be concentrated in these areas. There is potential for impacts on all groups of interest, but due to the proximity of concentrated development to predominantly Native American communities, development may affect the values important to groups and individuals in these communities.

BLM No Action Alternative

Economic impacts under the BLM No Action Alternative reflect current management practices and baseline economic conditions, as discussed in the Affected Environment Supplemental Report, Section AE.5.2, Social and Economic Uses. Oil and gas development in the planning area would continue to support area employment, income, and economic contributions. Employment, labor income, and overall economic output from the BLM No Action Alternative are described in **Table 3-50**. Note that all impacts are total impacts, representing the sum of direct, indirect, and induced impacts.

In addition, production of federal minerals would result in contributions to local employment, income, and economic output. Because of the reduced demand for employment for this phase, and because much of the revenue associated with production is distributed out of the local area, total economic contributions for this stage are less than those for development. Total employment, total labor income, and total economic output from the BLM No Action Alternative are described in **Table 3-51**.

Tax revenues associated with oil and gas are also examined by alternative. This analysis is focused on the revenue associated with the production phase. Estimates for direct contributions at the state level are provided in **Table 3-52**.

Tax revenue, including that associated with income, payroll, and gross receipts tax, would also be contributed in the development phase. These contributions are included in the total economic output figure in **Table 3-51**, Regional Economic Impact from Production of Federal Minerals.

Should the demand for labor exceed the local labor force, it would require operators to seek employees from outside the local area. Increased population growth, due to oil and gas development and temporary relocation, would increase economic activity, but it could alter the local social setting and strain public services, depending on the rate and level of growth (Smith et al. 2001). Additionally, increases in new income

Table 3-50
Economic Impact from Drilling and Completion of Federal Mineral Wells

Year	BLM No Action Alternative	BLM Alternative A	BLM Sub- Alternative B1	BLM Sub- Alternative B2	BLM Sub- Alternative C1	BLM Sub- Alternative C2	BLM Sub- Alternative C3	BLM Sub- Alternative C4	BLM Sub- Alternative C5	BLM Sub- Alternative C6	BLM Alternative D
2018											
Total Employment	1,188	908	908	694	1,188	1,188	1,188	1,188	1,188	1,188	1,214
Total Labor Income	\$70,151,958	\$53,689,130	\$53,689,130	\$40,918,333	\$70,151,958	\$70,151,958	\$70,151,958	\$70,151,958	\$70,151,958	\$70,151,958	\$71,759,236
Total Output	\$187,381,650	\$143,279,705	\$143,279,705	\$109,334,399	\$187,381,650	\$187,381,650	\$187,381,650	\$187,381,650	\$187,381,650	\$187,381,650	\$191,539,505
2028											
Total Employment	2,978	2,275	2,249	1,775	2,978	2,978	2,968	2,943	2,943	2,943	2,988
Total Labor Income	\$175,922,940	\$134,483,418	\$132,876,141	\$104,684,892	\$175,922,940	\$175,922,940	\$175,401,751	\$173,794,474	\$173,794,474	\$173,794,474	\$176,444,128
Total Output	\$469,783,205	\$358,949,110	\$354,791,255	\$279,743,396	\$469,783,205	\$469,783,205	\$468,283,509	\$464,125,654	\$464,125,654	\$464,240,062	\$471,282,901
2037											
Total Employment	4,554	3,468	3,402	2,657	4,508	4,508	4,472	4,534	4,488	4,534	4,518
Total Labor Income	\$268,923,124	\$205,200,277	\$200,899,633	\$156,766,744	\$266,273,470	\$266,273,470	\$264,145,004	\$267,880,748	\$265,231,093	\$267,880,748	\$266,794,658
Total Output	\$718,239,454	\$547,489,223	\$536,515,355	\$418,865,246	\$711,082,207	\$711,082,207	\$705,424,656	\$715,240,062	\$708,082,815	\$715,240,062	\$712,581,903

Source (IMPLAN 2017)

Table 3-51
Regional Economic Impact from Production of Federal Minerals

Variable	BLM No Action Alternative	BLM Alternative A	BLM Sub-Alternative B1	BLM Sub-Alternative B2	BLM Sub-Alternative C1	BLM Sub-Alternative C2	BLM Sub-Alternative C3	BLM Sub-Alternative C4	BLM Sub-Alternative C5	BLM Sub-Alternative C6	BLM Alternative D
2018											
Total Employment	1,138	1,106	1,104	1,081	1,138	1,138	1,138	1,137	1,137	1,137	1,139
Total Labor Income	\$75,956,241	\$73,783,480	\$73,670,954	\$72,129,379	\$75,926,401	\$75,918,864	\$75,915,059	\$75,899,581	\$75,877,682	\$75,891,805	\$75,989,814
Total Output	\$274,279,232	\$266,433,357	\$266,027,024	\$260,460,371	\$274,171,480	\$274,144,262	\$274,130,523	\$274,074,630	\$273,995,552	\$274,046,553	\$274,400,463
2028											
Total Employment	1,495	1,167	1,160	949	1,490	1,488	1,487	1,485	1,480	1,483	1,500
Total Labor Income	\$99,738,810	\$77,886,194	\$77,411,745	\$63,301,453	\$99,407,568	\$99,291,161	\$99,204,200	\$99,065,261	\$98,756,550	\$98,955,768	\$100,092,909
Total Output	\$360,158,479	\$281,248,325	\$279,535,081	\$228,582,585	\$358,962,359	\$358,542,011	\$358,227,991	\$357,726,281	\$356,611,522	\$357,330,900	\$361,437,135
2037											
Total Employment	2,602	1,948	1,959	1,561	2,592	2,589	2,586	2,582	2,575	2,578	2,612
Total Labor Income	\$173,651,259	\$131,261,148	\$130,725,525	\$104,190,648	\$172,978,935	\$172,744,825	\$172,540,339	\$172,276,266	\$171,846,287	\$172,034,302	\$174,345,354
Total Output	\$627,057,543	\$473,986,155	\$472,052,015	\$376,234,139	\$624,629,770	\$623,784,394	\$623,045,991	\$622,092,419	\$620,539,759	\$621,218,684	\$629,563,930

Source (IMPLAN 2017)

Table 3-52
Estimated Oil and Gas Tax Revenues by Alternative

Tax Type	BLM No Action Alternative	BLM Alternative A	BLM Sub- Alternative B1	BLM Sub- Alternative B2	BLM Sub- Alternative C1	BLM Sub- Alternative C2	BLM Sub- Alternative C3	BLM Sub- Alternative C4	BLM Sub- Alternative C5	BLM Sub- Alternative C6	BLM Alternative D
2018											
State Federal Mineral Royalties (New Mexico share)	\$58,672,827	\$56,994,46	\$56,907,545	\$55,716,746	\$58,649,777	\$58,643,955	\$58,641,016	\$58,629,060	\$58,612,144	\$58,623,054	\$ 58,698,761
State Severance Taxes	\$27,502,888	\$26,716,156	\$26,675,412	\$26,117,225	\$27,492,083	\$27,489,354	\$27,487,976	\$27,482,372	\$27,474,442	\$27,479,556	\$27,515,044
Emergency School Tax	\$24,695,254	\$23,904,379	\$23,860,704	\$23,293,741	\$24,684,549	\$24,681,930	\$24,680,773	\$24,675,087	\$24,667,449	\$24,672,397	\$24,707,420
Conservation Tax	\$1,760,185	\$1,709,834	\$1,707,226	\$1,671,502	\$1,759,493	\$1,759,319	\$1,759,230	\$1,758,872	\$1,758,364	\$1,758,692	\$1,760,963
2028											
State Federal Mineral Royalties (New Mexico share)	\$77,043,807	\$60,163,631	\$59,797,140	\$48,897,565	\$76,787,937	\$76,698,018	\$76,630,844	\$76,523,520	\$76,285,055	\$76,438,942	\$7,317,333
State Severance Taxes	\$36,114,285	\$28,201,702	\$28,029,909	\$22,920,734	\$35,994,346	\$35,952,196	\$35,920,708	\$35,870,400	\$35,758,619	\$35,830,754	\$36,242,500
Emergency School Tax	\$35,395,573	\$27,660,026	\$27,444,787	\$22,346,135	\$35,281,205	\$35,241,827	\$35,214,810	\$35,165,741	\$35,061,064	\$35,129,034	\$35,519,731
Conservation Tax	\$2,311,314	\$1,804,909	\$1,793,914	\$1,466,927	\$2,303,638	\$2,300,941	\$2,298,925	\$2,295,706	\$2,288,552	\$2,293,168	\$2,319,520
2037											
State Federal Mineral Royalties (New Mexico share)	\$134,137,896	\$101,393,414	\$100,979,670	\$80,482,654	\$133,618,555	\$133,437,715	\$133,279,759	\$133,075,774	\$132,743,635	\$132,888,868	\$134,674,053
State Severance Taxes	\$62,877,139	\$47,528,163	\$47,334,220	\$37,726,244	\$62,633,698	\$62,548,929	\$62,474,887	\$62,379,269	\$62,223,579	\$62,291,657	\$63,128,462
Emergency School Tax	\$61,803,908	\$46,859,776	\$46,567,952	\$36,987,046	\$61,572,991	\$61,494,695	\$61,430,566	\$61,338,000	\$61,203,353	\$61,256,671	\$62,045,959
Conservation Tax	\$4,024,137	\$3,041,802	\$3,029,390	\$2,414,480	\$4,008,557	\$4,003,131	\$3,998,393	\$3,992,273	\$3,982,309	\$3,986,666	\$4,040,222

and a population influx have led some oil and gas boomtowns—unprepared for such demographic changes—to experience increased rates of crime and human trafficking (Horwitz 2014). Impacts from an influx of employees from outside the local area are further described in *Nature and Type of Effects* in the Environmental Consequences Supplemental Report, Section EC.7.2, Social and Economic Uses.

Under the BLM No Action Alternative, limited stipulations would be in place to limit the impacts of mineral development. Development would continue to have the potential to affect quality of life, property values, and other land uses, with impacts on specific user groups from development as outlined in **Table 3-53** and further discussed under *Nature and Type of Effects* in the Environmental Consequences Supplemental Report, Section EC.7.2, Social and Economic Uses.

Table 3-53
Potential Quality of Life Impacts from Oil and Gas Development

Impacts	Associated Changes to Quality of Life
Excess vehicle traffic	Reductions to ambient air quality; increased road noise; dust accumulation; damaged roads; human safety issues; increased cost of road maintenance diverting monies from other uses; increased wear on vehicles for local residents leading to additional maintenance and repairs
Population influx	Changes to community social structures; strain on resources such as government services, schools, and emergency services; increased demand for housing; increased crime and potential for human trafficking
New employment opportunities	Increased wages, tax revenues, and indirect economic contributions
Ongoing development activities	Potential to decrease water quality; potential for noise, including low-frequency noise; reductions to the visual setting; reduced opportunities for recreation
New oil and gas infrastructure	Reductions to ambient air quality from flaring; potential to decrease water quality; construction- and drilling-associated noise; reductions to the visual setting; reduced opportunities for recreation
Changes to traditional land uses	Reduced opportunities for traditional plant gathering and diminished opportunities for traditional ceremonies; impacts on nonmarket spiritual values

Many of the quality of life components and other social impacts can be discussed only in terms of nonmarket values. As discussed in the Affected Environment Supplemental Report Section AE.5.2, Social and Economic Uses, these are the benefits derived by society from the uses or experiences that are not dispensed through markets and do not require payment.

In addition to impacts from mineral development, management actions for vegetation, lands with wilderness characteristics, and lands and realty have potential to impact nonmarket values. No specific measures would be in place for vegetation management or to protect lands with wilderness characteristics. This could result in potential degradation of the ecosystem services provided by vegetation communities (i.e., supporting services), as well as the natural setting for recreation (information services). Similarly, no ROW limitations would be in place. As a result, transportation access for mineral development and other uses would not be restricted, but there is potential for disruption of rural communities and areas should routes allow increased access to these areas. The BLM could continue to use its discretion to relocate ROWs as needed to protect sensitive resources.

BLM Alternative A

Under BLM Alternative A, economic impacts from drilling and completion would be less than those estimated under the BLM No Action Alternative. Total economic output would be reduced by approximately

24 percent for drilling and completion at year 10 of plan implementation (see **Table 3-51**). Impacts from production would be similarly reduced across all years examined, when compared with the BLM No Action Alternative. Total economic output would be reduced by approximately 22 percent for production at year 10 of plan implementation (see **Table 3-51**). Because taxes reported are based on production values, these contributions would be similarly reduced (see **Table 3-52**).

In addition to the changes to the economic impacts reported, increased acres open to development with stipulations may affect the timing and location of development. If stipulation costs increase development costs, then development on federal lands may not be worthwhile, particularly in times of lower market values for natural gas and crude oil. This could further reduce the development and associated economic impacts for the predicted values.

In addition to a reduction in local employment opportunities and contributions from direct and indirect spending, tax distributions to state and local governments would be reduced, potentially affecting the funds available for public services and infrastructure, and contributions to local and state services. With the decreased development of federal minerals under this alternative, however, the potential for changes in population would be reduced, and the related demand for public services would likely be decreased as compared with the BLM No Action Alternative.

Reduced potential for population influx and construction-related impacts, such as truck traffic, would reduce the level of impacts on the social setting, particularly for local populations adjacent to areas of concentrated development. Inclusion of NSO stipulations within 0.25 miles of residential, community, municipal, and public structures and buildings, as well as around domestic wells, would decrease the impacts on individuals and communities adjacent to development.

Impacts on nonmarket values under BLM Alternative A could include the preservation of land uses valued by recreationalists and ranchers. In addition, reduced potential for development could support preservation of traditional cultural land uses and the historic setting for Native Americans and local residents.

In terms of ecosystem services, restrictions on development under BLM Alternative A would likely support all services provided, including provisioning service of water and other land uses, supporting services of wildlife habitat, and regulating services for water resources and services associated with human use of the natural setting.

In addition to restrictions on fluid minerals, inclusion of protection for wilderness characteristics on 24,300 acres and management of vegetation communities to create a diverse and resilient ecosystem would enhance contributions from the natural setting, as compared with the BLM No Action Alternative. A reduction in the areas open to ROW authorization to 226,600 acres (83 percent reduction from the No Action Alternative) would result in decreased level of potential impacts on residences from use of roads, but they could limit access for land use important to local residential groups.

BLM Alternative B (Includes BLM Sub-Alternatives B1-B2)

Due to the similar level of restrictions on development, predicted development, and production levels, impacts would be similar to BLM Alternative A.

Fiscal impacts, impacts on quality of life, impacts on other land uses, and impacts on nonmarket values and ecosystem services would be similar to those discussed under BLM Alternative A. Managing all lands with wilderness characteristics to protect those characteristics as a priority over other multiple uses and managing vegetation communities to enhance unique landscapes, while sustaining and increasing native vegetation communities would support contributions from nonmarket values. Similar to Alternative A, reduction in the areas open to ROW authorization (334,800 acres, a 75 percent reduction from the No Action Alternative) would result in decreased level of potential impacts on residences from use of roads, but they could limit access for land use important to local residential groups.

Impacts from fluid mineral development would vary by sub-alternative. Under BLM Sub-Alternative B1, total economic output would be reduced by approximately 32 percent for drilling and completion at year 10 of plan implementation compared with the BLM No Action Alternative (see **Table 3-50**). Contributions from production would be similarly reduced across all years examined. Total economic output would be reduced by approximately 29 percent for production at year 10 of plan implementation (**Table 3-51**). Because taxes reported are based on production values, these contributions would be similarly reduced (see **Table 3-52**).

BLM Sub-Alternative B1 would close additional acres around sensitive areas, including the CCNHP. This would result in lower potential for impacts on nonmarket contributions (especially values of traditional cultural and historic setting important for some Native Americans) and ecosystem services supported by these areas as compared with the No Action Alternative.

Impacts under BLM Sub-Alternative B2 would be similar to those describe under BLM Sub-Alternative B1. Under BLM Sub-Alternative B2, total economic output would be reduced by approximately 40.5 percent for drilling and completion at year 10 of plan implementation compared with the BLM No Action Alternative (see **Table 3-51**). Contributions from production would be similarly reduced across all years examined. Total economic output would be reduced by approximately 36.5 percent for production at year 10 of plan implementation, and taxes would be similarly reduced (see **Table 3-51** and **Table 3-52**).

Fiscal impacts, impacts on quality of life, impacts on other land uses, and impacts on nonmarket values and ecosystem services would be similar to those discussed under BLM Sub-Alternative B1. Of all the alternatives, BLM Sub-Alternative B2 would close the largest number of acres around sensitive areas, including the CCNHP. This would result in the lowest potential for impacts on nonmarket contributions and ecosystem services supported by these areas.

BLM Alternative C (Includes BLM Sub-Alternatives C1–C6)

BLM Alternative C would provide opportunities for development but impose some additional site-specific limitations to minimize impacts on communities, as compared with the BLM No Action Alternative.

Impacts from management under BLM Alternative C to prioritize multiple uses over wilderness characteristics and to allow for traditional and historic uses of vegetation would be similar to the BLM No Action Alternative, with potential impacts on ecosystem services. The slight reduction in the areas open to ROW authorization (1,307,200 acres, a 1 percent reduction from the BLM No Action Alternative) would result in decreased level of potential impacts on residences from use of roads, but they could limit access for land use important to local residential groups.

Impacts from fluid mineral development would vary by sub-alternative. Under BLM Sub-Alternative C1, the level of drilling and completion would be the same as the BLM No Action Alternative under year one of plan implementation, therefore economic output would remain the same. A slight decrease in predicted number of wells and related economic output would be seen by the end of the planning period (see **Table 3-50**). Contributions from production would have similar minimal changes as compared with the BLM No Action Alternative under BLM Sub-Alternative C1 (less than 1 percent reduction in total economic output for production at year 10 of plan implementation) (see **Table 3-51**). Because taxes reported are based on production values, these contributions would be similarly slightly reduced (see **Table 3-52**).

Impacts on the social setting and quality of life would likely be reduced as compared with the BLM No Action Alternative. This is due to the application of NSO stipulations in a 0.7-mile zone around residential, community, and municipal buildings. Nonmarket values important to local residents and Native American groups could be retained or potentially enhanced by the inclusion of NSO and CSU stipulations around sensitive resources and historic sites, including the NSO stipulation for 2 miles around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola. As noted in the Native American and Tribal Interests and Uses section (**Section 3.7.1**) and Visual Resources section (**Section 3.4.1.1**) these fluid mineral leasing stipulations would reduce indirect visual, noise, and vibration impacts that could diminish setting for sites

with historical or spiritual importance. It should be noted, however, that these NSO stipulations around the CCNHP under BLM Sub-Alternative C1 would primarily fall within areas of negligible or low potential for development in the southwest portion of the planning area, therefore the practical limitations on development and related impacts under current technology and market conditions may be minimal.

Inclusion of stipulations under BLM Sub-Alternative C1 could support the contribution of ecosystem services, including provisioning service of water and other land uses, supporting services of wildlife habitat, and regulating services for water resources. In addition, information services associated with cultural values would be supported by the emphasis of cultural resources and traditional cultural ways of life and communities, which are emphasized for protection under BLM Sub-Alternative C1.

Under BLM Sub-Alternative C2, impacts would be similar to those described under BLM Sub-Alternative C1, except that the four-mile NSO zone around CCNHP, Pueblo Pintado, and Kin Bineola would create an increase in acres subject to NSO stipulations in the BLM mineral decision area. In the site-specific areas impacted, this increase in NSO stipulations would further reduce potential for social impacts and impacts on ecosystem services from development as discussed under BLM Sub-Alternative C1. This NSO stipulation would include area with negligible to low potential for development, therefore practical impacts may be limited as discussed under BLM Sub-Alternative C1. The number of wells forecast is the same as under BLM Sub-Alternative C1. As shown in **Table 3-50**, the level of drilling and completion would be the same as the no action Alternative under year one of plan implementation, and slightly decrease in predicted number of wells and related economic output by the end of the planning period. Economic contributions from production and taxes under BLM Sub-Alternative C2 would also have minimal changes as compared with the No Action Alternative (less than one percent reduction in total economic output for production at year 10 of plan implementation [see **Table 3-51** and **Table 3-52**]).

Under BLM Sub-Alternative C3, impacts would be similar to those described under BLM Sub-Alternative C1, except that the six-mile NSO zone around CCNHP, Pueblo Pintado, and Kin Bineola would create an increase in acres subject to NSO stipulations in the BLM mineral decision area. In the site-specific areas impacted, this increase in NSO stipulations would further reduce potential for social impacts and impacts on ecosystem services from development as discussed under BLM Sub-Alternative C1. The area impacted by the NSO would be expanded to include areas with low to medium potential for development, increasing potential for reduced impacts from development in these areas. For the planning area overall, changes would remain minimal. As shown in **Table 3-50**, the reduction in wells drilling and completion associated with this NSO stipulation would result in a less than one percent reduction under BLM Sub-Alternative C3 compared with the BLM No Action Alternative. Economic contributions from production and production taxes under BLM Sub-Alternative C3 would also have minimal changes as compared with the No Action Alternative (less than one percent reduction in total economic output for production at year 10 of plan implementation [see **Table 3-51**]).

Under BLM Sub-Alternative C4, impacts would be similar to those described under BLM Sub-Alternative C1, except that the eight-mile NSO zone around CCNHP, Pueblo Pintado, and Kin Bineola would create an increase in acres subject to NSO stipulations in the BLM mineral decision area. In the site-specific areas impacted, this increase in NSO stipulations would further reduce potential for social impacts and impacts on ecosystem services from development as discussed under BLM Sub-Alternative C1. The NSO area would be expanded to include areas with medium potential for development, increasing potential for reduced impacts from development in these areas. Impacts at the planning area would remain minimal. As shown in **Table 3-50**, the reduction in wells drilling and completion associated with this NSO stipulation would result in an approximant one percent decrease in total economic output in year 10 compared with the BLM No Action Alternative. The level of contributions is affected by the ratio of horizontal to vertical wells and the difference in costs to develop these wells. Economic contributions from production and production taxes under BLM Sub-Alternative C4 would also be slightly reduced compared with the No Action Alternative

(one percent reduction in total economic output for production at year 10 of plan implementation [see **Table 3-51**]).

Under BLM Sub-Alternative C5, impacts would be similar to those described under BLM Sub-Alternative C1, except that the ten-mile NSO zone around CCNHP, Pueblo Pintado, and Kin Bineola would create an increase in acres subject to NSO stipulations in the BLM mineral decision area. In the site-specific areas impacted, this increase in NSO stipulations would further reduce potential for social impacts and impacts on ecosystem services from development as discussed under BLM Sub-Alternative C1. The NSO area would be expanded to include areas with medium and high potential for development, increasing potential for reduced impacts from development in these areas. Changes at the planning area scale would remain minimal. As shown in **Table 3-50**, the reduction in wells drilling and completion associated with this NSO stipulation would result in an approximant 1 percent decrease in total economic output in year 10 compared with the BLM No Action Alternative. Economic contributions from production and production taxes under BLM Sub-Alternative C5 would also be slightly reduced compared with the No Action Alternative (one percent reduction in total economic output for production at year 10 of plan implementation [see **Table 3-51**]).

Under BLM Sub-Alternative C6, impacts would be similar to those described under BLM Sub-Alternative C3, except around CCHNP, Pueblo Pintado, and Kin Bineola, there would be a four-mile inner zone (miles 0-4) closed to leasing followed by a two-mile outer NSO zone (miles 4-6). Impacts on nonmarket contributions (such as traditional cultural values and historical setting values for some Native Americans) and ecosystem services would be similar to those described under BLM Alternative B, but to a lesser degree. The outer NSO zone would further reduce the potential for social impacts or impacts on ecosystem services. The area impacted by the NSO would include areas with low to medium potential for development. Changes at the planning area scale would remain minimal. As shown in **Table 3-50**, the reduction in wells drilling and completion associated with this NSO stipulation would result in a less than 1 percent reduction in total economic output in year 10 compared with the BLM No Action Alternative. Economic contributions from production and production taxes under C6 would also be slightly reduced compared with the BLM No Action Alternative (less than one percent reduction in total economic output for production at year 10 of plan implementation [see **Table 3-51**]).

BLM Alternative D

BLM Alternative D would provide a similar level of estimated development and associated economic impacts as discussed under the BLM No Action Alternative. Total economic output under BLM Alternative D would be slightly increased (less than one percent increase in output supported by drilling and completion at year 10 of plan implementation [see **Table 3-50**]). Impacts from production would have similar minor increases across all years examined, when compared with the BLM No Action Alternative. Total economic output would be increased by approximately 1 percent for production at year 10 of plan implementation (see **Table 3-51**). Because taxes reported are based on production values, these contributions would be similarly increased (see **Table 3-52**), with some minimal potential for impacts on public services and infrastructure.

Impacts on the social setting, quality of life, and other land uses (including market and nonmarket contributions) would be similar to those described under the BLM No Action Alternative; however, the inclusion of additional stipulations, including an NSO stipulation in a 656-foot (200-meter) zone around residential, community, municipal, and public structures and buildings, may result in a reduction in the level of impacts on local communities and the social setting. The potential for impacts on other land uses and associated nonmarket values from resource development would remain, as discussed under the BLM No Action Alternative.

Impacts from management of vegetation, lands with wilderness characteristics and ROW authorizations would be as described under BLM Alternative C.

BIA Alternatives

Because the BIA is not changing leasing allocations or considering reductions or increases in the number of acres open or closed to leasing under this EIS, an RFD scenario and accompanying economic analysis are not possible for the BIA by alternative. Estimated regional economic impacts from oil and gas development and production are provided for the BIA No Action Alternative. Variations in impacts from BIA action alternatives are discussed qualitatively.

Impacts Common to All BIA Alternatives

Under all BIA alternatives, in accordance with the Navajo Nation Indian Preference Act (15 N.N.C. Section 601), qualified Navajo or non-Navajo married to Navajo have hiring preference on Navajo trust lands. Economic impacts from increased employment opportunities for the Navajo under each alternative would be limited by the number of qualified individuals that can fill vacancies in the labor pool.

Under all BIA alternatives, additional oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-54**. It should be noted that the accuracy of economic impacts as calculated by the IMPLAN model and shown below may be impacted by the unique economic setting of the Tribal communities in the planning area. As discussed in the Affected Environment Supplemental Report Section AE.5.2, Social and Economic Uses, within the Navajo Nation Chapters the local economic setting and housing characteristics vary from that in the County level populations. Employment changes resulting from this development may affect achievement of the goals outlined in Executive Order 13790, Promoting Agriculture and Rural Prosperity in America (82 FR 20237-20239).

BIA No Action Alternative

Under the BIA No Action Alternative, social and economic impacts would continue to occur as they currently do under existing BIA management. The existing social and economic conditions of the planning area are described in the Affected Environment Supplemental Report Section AE.5.2, Social and Economic Uses. Estimated economic contributions are provided in **Table 3-54**. Note that all impacts are total impacts, representing the sum of direct, indirect, and induced impacts.

**Table 3-54
Economic Impact from Development and Production of Tribal and Allotted Wells**

Variable	Tribal Wells Development (Drilling and Completion)	Tribal Wells Production	Allotted Wells Development (Drilling and Completion)	Allotted Wells Production
2018				
Total Employment	86	81	228	216
Total Labor Income	\$5,030,463	\$5,405,253	\$13,414,569	\$14,414,007
Total Output	\$10,042,750	\$19,518,456	\$26,780,666	\$52,049,217
2028				
Total Employment	200	103	542	281
Total Labor Income	\$11,737,748	\$6,896,147	\$31,859,601	\$18,718,112
Total Output	\$23,433,082	\$24,902,098	\$63,604,081	\$67,591,410
2037				
Total Employment	314	112	827	498
Total Labor Income	\$18,445,032	\$7,459,428	\$48,627,812	\$33,250,040
Total Output	\$36,823,415	\$26,936,116	\$97,079,913	\$120,066,440

Source (IMPLAN 2017)

Tax revenues associated with oil and gas development would represent additional contributions, although tax collection and distribution differs for Tribal trust and allotted lands. For leases on allotted lands, any revenues from oil and gas leasing that are paid to allottees are considered as personal income and are taxed accordingly. As discussed in the Affected Environment Supplemental Report Section AE.5.2, Social and

Economic Uses, the Navajo Nation collects revenue for mineral production including, but not limited to, an oil and gas severance tax at a rate of 4 percent. Leases on Indian trust land are subject to Navajo Nation taxation. Collection of Navajo severance tax would be determined on an individual lease level based on the New Mexico Intergovernmental Tax Credit Act. Possessory interest tax of 3 percent is collected on all leases granted by the Navajo Nation with a value of more than \$100,000. Due to the distribution of the majority of wells on allotted lands, tax revenue collected and distributed to local communities is limited.

Royalty rates are specified by lease and are variable; 100 percent of revenue received for production of BIA minerals is distributed to the Tribe or individual allottees. Under all alternatives, oil and gas production would continue, and related distributions of tax revenue would continue. All oil and gas production taxes would be affected by the level of development and the market price of mineral resources.

Anticipated impacts from current management could include impacts from development, as described under the *Nature and Type of Effects* in the Environmental Consequences Supplemental Report, Section EC.7.2, Social and Economic Uses. Economic impacts could increase or decrease in magnitude dependent on the level of future development. Impacts on residents adjacent to oil and gas development on Tribal trust lands would be reduced due to restrictions on drilling within 500 feet of houses and water sources. For Navajo allotment lands, protective measures would be applied within 200 feet of dwellings or improvements.

BIA Alternative A

BIA Alternative A would codify many existing development practices and current regulations from other applicable laws, making them apply specifically to BIA-managed mineral decisions. Under BIA Alternative A, the anticipated social and economic impacts would be similar to those described under the BIA No Action Alternative, but economic impacts on lessees and operators could be increased under BIA Alternative A, as there would be more enforceable regulations at the lease, drilling, operation, abandonment, and reclamation stages of development. New stipulations, such as requirements to shield lighting and flaring, could have impacts such as increased costs for operators.

A new lease stipulation on individual Indian allotment lands that would remove the lessor's right to use gas free of charge for heating, cooking, and lighting by accessing leased wells on said lands could have financial impacts on individual Indian allotment lessors. The remoteness of some occupied dwellings might make it difficult to gain access to other energy sources or may place additional cost burdens on such populations that did not previously exist. Applying this stipulation could, however, increase the safety of allottees. This is because these types of connections provide gas that does not contain the additive mercaptan, which has a distinctive odor to allow for detection of leaks. Prohibiting connections would therefore reduce the potential for unidentified leaks and associated safety concerns.

BIA Alternative B

Social and economic impacts under BIA Alternative B would be the same as impacts under BIA Alternative A. In addition, lessees may face additional economic costs to meet requirements to hide infrastructure from sensitive cultural sites and viewsheds.

BIA Alternative C

Social and economic impacts under BIA Alternative C would be the same as impacts under BIA Alternative B.

BIA Alternative D

Social and economic impacts under BIA Alternative D would generally be the same as impacts described under the BIA No Action Alternative. BIA Alternative D does afford more discretion to Navajo allottees, including a stipulation that allows siting infrastructure within 200 feet of a current dwelling or structure with the surface owners' consent. This could provide additional flexibility for development, which may reduce costs. Regulations, such as requirements to shield lighting and flaring, could have impacts such as increased costs for operators.

Lease stipulations that prohibit lessors from accessing gas on individual Indian allotment lands could affect costs of energy and reduce safety risks, as discussed under BIA Alternative A.

Cumulative Effects

Economic impacts from employment, labor income, economic output, and changes to the social setting of the planning area could be compounded when considered with other concurrent or future projects in the planning area and surrounding area. Such current and future projects are not limited to federal projects and include potential development on private, Tribal, Indian allotted, and state lands.

Reasonably foreseeable future projects that could contribute to cumulative impacts include, but are not limited to, a proposed new coal mine in the Pinabete Mine Permit area by the Navajo Transitional Energy Company and renewed permits for the Four Corners Power Plant and Navajo Mine. In addition to the Tribal and federal mineral development discussed above, oil and gas development of state and private minerals would continue. The level to which federal and Tribal mineral development would contribute to cumulative impacts would vary by alternative, based on the area open for development and the restrictions applied.

Quantitative analysis of the impacts on jobs, income, economic output, or demands on public services, and changes to social setting is not feasible due to uncertainties as to the specific timing and location of development. The greatest level of impacts would occur if project development were concurrent with the development of oil and gas wells described in this planning process.

Based on 2019 RFD estimates for total well development levels, it is estimated that wells developed on federal mineral estate represent approximately 61 percent of total wells drilled under the BLM No Action Alternative. BIA wells are estimated to represent 16 percent of total wells drilled. In comparison, due to restrictions on development under BLM Alternative A, federal wells would represent approximately 53 percent of wells, respectively. Alternative B federal wells would represent 48 and 54 percent of all wells. Under BLM Alternative C, federal wells would represent between 60 to 61 percent of total wells under all sub-alternatives. Under Alternative D, this figure would also be 61 percent. The contribution to cumulative impacts from development would follow the level of federal development, with a greater level of contributions occurring under the BLM No Action Alternative and Alternatives C and D, and a lesser level under BLM Alternatives A and B.

While economic impacts of concurrent development projects would likely result in a net economic gain for the region, pressures on community resources, such as available housing, education, and emergency services, could increase and cause a further strain on already limited community services in the mostly rural planning area. In addition, increased development could affect other land uses and the market and nonmarket values associated with those uses. The level of contributions to these impacts would follow the level of federal mineral development as described above.

Due to the reduced requirements for employment and ground-disturbing activities during the production phase, cumulative economic contributions, as well as impacts on the social setting and other resource uses, would be reduced as compared with those for drilling and development activities. As for drilling and completion, the contributions to cumulative impacts from these activities would vary by alternative, with the greatest contribution to cumulative impacts occurring under BLM Alternatives D, C, and the No Action Alternative, and the lowest level of contributions under BLM Alternatives A and B.

3.7.3 Environmental Justice

Affected Environment

Environmental justice populations consist of individuals and families with incomes below the national poverty level and people who self-identify as belonging to one or more ethnic or racial minority groups. Impacts on these populations from proposed federal actions would normally be the same as those considered for the entire population of a planning area. If, however, some impacts would have an adverse and disproportionate

impact on identified environmental justice populations, then environmental justice impacts would be assessed.

Current Conditions

Regulations and Guidance

Environmental justice refers to the fair treatment and meaningful involvement of people of all races, cultures, and incomes, with respect to the development, implementation, and enforcement of environmental laws, regulations, programs, and policies. It focuses on environmental hazards and human health to avoid disproportionately high and adverse human health or environmental impacts on minority and low-income populations.

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires federal agencies to identify and address any disproportionately high and adverse human health or environmental impacts of their programs, policies, and activities on minority and low-income populations.

Minorities are defined as individuals who identify as one or more of the following population groups:

- American Indian or Alaskan Native
- Asian or Pacific Islander
- Black, not of Hispanic/Latino origin
- Hispanic/Latino of any race

Low-income populations are defined by the US Census Bureau (2016) as persons living below the poverty level, based on total income of \$12,486 for an individual and \$24,339 for a family of four for 2014 data. The BLM, BIA, CEQ, and EPA guidance, however, do not provide a quantitative threshold¹⁸ for determining whether a population should be considered low income. For this analysis, the percentage of persons in poverty in the study area is compared with that of the state.

The FMG RMPA/EIS planning area includes all or portions of McKinley, Rio Arriba, Sandoval, and San Juan Counties in New Mexico. For environmental justice analysis, populations in all counties have been examined using USCB data to determine the percentage of low-income, minority, and Tribal populations. In addition, where data were available, key communities and Tribal populations in the area were examined. For the purpose of identifying a minority or a low-income population concentration, the comparison population used in this study is New Mexico as a whole. The information below applies to BLM- and BIA-managed lands.

In addition to the consideration of specific thresholds, other factors may determine if a population should be considered for further examination of impacts on low-income or minority populations. The BLM and BIA have incorporated the recommendations provided in the EPA's Promising Practices for EJ Methodologies in NEPA Reviews (EPA 2016c). Specifically, the agencies worked with the Navajo Nation and other potentially affected groups in the planning area to identify available data sources and topics of concern. Unique conditions of the potentially affected minority populations and low-income populations that may be affected by the proposed action are noted where applicable below.

Low-Income Populations

The BLM and BIA used income and poverty data estimates for study area counties from the USCB Small Area Poverty Estimates model to examine poverty at the county level. These data indicate that the percentage of the population living below the poverty level ranged from 34.1 percent in McKinley County to 11.2 percent in Sandoval County. Sandoval County and San Juan County had a lower percentage of the population in poverty than that of the state average (see Section AE.5.3 of the Affected Environment Supplemental Report).

¹⁸ A limit on the percentage of persons in poverty

Similarly, estimates from 2015 indicate that Sandoval County had a family median income (\$73,181) above that of the state level of \$55,049. All other counties were below the state level in 2015, notably McKinley County (\$28,772) was around half of the state level. USCB American Community Survey data was used to examine poverty at the community level. The highest poverty rates were seen in the communities of Española (28.0 percent) and Gallup (25.5 percent; see Affected Environment Supplemental Report, Section AE.5.3 Environmental Justice).

Census tracts are geographic regions defined by the USCB within the United States based on population size and are designed to track changes in a population. The average population of a census tract is about 4,000 people, so rural areas that are sparsely populated may have large census tracts, while densely populated urban areas may have small census tracts.

Forty-seven of 87 census tracts in the planning area had a greater level of individuals living below the poverty line than the state level. In addition, 2 out of 87 tracts in the socioeconomic study area have greater than 50 percent of individuals living below the poverty line: Census Tract 9405 in southwestern McKinley County and Census Tract 9409 in northwestern Sandoval County (US Census Bureau 2015). These census tracts are relatively large and in a sparsely populated, rural area (see **Figure 3-26**, Low-Income Populations by Census Tract).

Minority Populations

Based on 2015 data, minorities made up 60.8 percent of the population in New Mexico, compared with 37.7 percent in the United States (US Census Bureau 2015). The proportion of minorities in counties within the socioeconomic study area substantially exceeded the United States and is slightly higher than the state average, as the population ranged from 90.1 percent minority in McKinley County to 54.5 percent in Sandoval County.

Within reservation boundaries, Native Americans represented most of the population. The largest minority groups outside of Tribal reservations were Hispanics/Latinos in Rio Arriba and Sandoval Counties, and Native Americans in McKinley and San Juan Counties.

Sixty-two of 87 tracts have a minority population greater than 50 percent, with most self-identifying as American Indian and Alaska Native under the USCB categorization system. Most of the study area is predominately minority, and areas that are not predominantly minority are based around Rio Rancho, the Aztec/Farmington/Bloomfield area, southeastern McKinley County, and north of Española (see **Figure 3-27**, Minority Populations by Census Tract). Bernalillo, Bloomfield, Española, and Gallup all are considered minority communities based on the CEQ guidelines (see Section AE.5.3 of the Affected Environment Supplemental Report).

Native American Populations

Native Americans account for a substantial portion of the study area population in some areas, notably McKinley and San Juan Counties wherein the American Indian populations are 73.9 and 37.4 percent, respectively. Three Tribal governments have reservations in the planning area: the Jicarilla Apache Nation, the Navajo Nation, and the Ute Mountain Ute Tribe (see Section AE.5.3 of the Affected Environment Supplemental Report). **Figure 3-28**, Tribal Nations shows a map of these three nations and how they intersect the Mancos-Gallup EIS planning area.

The planning area includes portions of two BIA agencies within the Navajo Regional Office. These two agencies—Eastern Navajo and Shiprock—also encompass chapters, which are Navajo Nation political subdivisions that each have distinct economic and cultural situations (see **Figure 3-29**, Navajo Nation Chapters). The chapters likely to be most affected by the activities analyzed in this EIS in the Eastern Agency are Nageezi, Huerfano, Counselor, Pueblo Pintado, Ojo Encino, Torreon/Star Lake, Whitehorse Lake, Becenti, Lake Valley, White Rock, and Newcomb. Chapters in the Shiprock Agency are Burnham, Hogback, Nenahnezad/San Juan, Sanostee, and Upper Fruitland.

Select socioeconomic data for Navajo chapters in the planning area are shown in the Affected Environment Supplemental Report, Section AE.5.3, Environmental Justice, along with the Navajo Nation. Burnham, Counselor, Nageezi, Ojo Encino, Pueblo Pintado, Sanostee, Torreon/Star Lake, and Whitehorse Lake have higher rates of individuals in poverty than that of the Navajo Nation; all chapters qualify as low-income and minority populations based on CEQ guidance.

Disparities in access and funding for healthcare and healthcare outcomes exist among Tribal populations. According to the San Juan County Community Health Profile, those in San Juan County have access to only 61.5 primary care physicians per 100,000 people, while New Mexicans as a whole have access to 73.7 (San Juan County 2011). Additionally, it is likely that persons in the planning area must drive further distances and spend more money traveling to access healthcare. Native Americans in rural communities experience higher rates of post-neonatal death rates, and health disparities continue beyond infancy; the age-adjusted death rate for adult Native Americans exceeds the general population by nearly 40 percent (Sarche and Spicer 2009).

Almost half of the planning area is composed of Tribal lands. This includes Tribal trust, Tribal fee, and individual Indian allotments. Each Tribe maintains a general concern for protecting and accessing areas of traditional and religious importance and the welfare of plants, animals, air, landforms, and water on reservations and public lands. The BLM and BIA incorporate information about traditional native and native practitioner plant gathering in their analysis of the impacts of any proposed activities (Boshell 2010).

Additional Tribal lands are located near the planning area and could be affected by proposed management actions, including the Southern Ute Indian Tribe's lands just north of the planning area in Colorado. The Pueblos of Zia and Jemez also are located just outside FFO boundaries. Further, there are Tribes that claim cultural affiliation with resources in the planning area such as the CCNHP (see **Section 3.7.1**, Native American Interests and Uses).

For Native communities, traditional uses of the land for subsistence are very important. Resources such as wild onions, berries, and pinyon nuts can be essential. Additionally, firewood from BLM-managed lands or from BIA-issued permits is a primary source of heat, and many Native American households in the planning area have limited access to other fuel sources due to economic constraints (Rio Puerco Alliance and Hasbidito 2013). Based on 2016 data use of wood as a primary fuel source for heat in Navajo Nation Chapters in the planning area ranged from 38.3 percent to 90.8 percent, compared with a state rate of 6.8 percent. Similarly, data from the Ojo Encino, Torreon/Star Lake, and Counselor chapters indicate that 93 percent of survey respondents in 2012 used wood for the primary source of heating their homes. Of this amount, approximately 60 percent was gathered from BLM-managed lands, with an additional 30 percent from unknown origin, which is also likely to include some BLM-managed lands (Rio Puerco Alliance and Hasbidito 2013). Average annual household costs for firewood were approximately \$338 in 2012 for a household in the area surveyed (Rio Puerco Alliance and Hasbidito 2013). These subsistence uses are dependent upon seasonal precipitation and growth patterns and are susceptible to impact from drought.

The BLM and BIA continue to consult with potentially affected Tribal groups about resources that may be affected and issues of concern. Meetings that were conducted are summarized in **Chapter 4**, Consultation and Coordination.

Land Grant Descendants

As discussed in the Affected Environment Supplemental Report, Section AE.5, Social and Economic Conditions, the Spanish and Mexican governments issued land grants in the area to facilitate development and farming. The two major types of land grants were private ones made to individuals and communal ones made to groups for the purpose of establishing settlements. The descendants of these original landholdings have a unique tie to the planning area and the potential to be affected by proposed actions. In New Mexico, there are approximately 26 community land grants with active boards, including the San Joaquin del Rio de Chama Land Grant located within the planning area.

Environmental Consequences

BLM Alternatives

Impacts Common to All BLM Alternatives

Fluid Minerals

Impacts common to all BLM alternatives on identified environmental justice populations could include those on human health, air quality, water quality, traditional cultural ways of life, social systems, and economic conditions. The types of impacts would be the same as those described under the relevant analysis for those resources for the general population; however, environmental justice populations are at a greater risk for impacts due to disparities in these populations as described in the Affected Environment Supplemental Report, Section AE.5.3 and Environmental Consequences Supplemental Report, Section EC.5.3.

The extent to which existing environmental justice populations are disproportionately affected by adverse human health or environmental impacts depends on whether environmental justice populations are more likely to be exposed to such impacts or are more vulnerable to them. While some research has indicated the existence of health disparities in Native American communities related to mining and environmental health (see Lewis et al. 2017), the exact level and intensity of impacts cannot be determined in the context of the FMG RMPA/EIS. This is because there is insufficient information on future site-specific well locations at this planning level and their proximity to existing environmental justice populations. The degree to which any implementation impacts would disproportionately or adversely affect environmental justice populations would be determined at the site-specific scale in future NEPA analyses.

It is possible to analyze which locations in the planning area have the highest potential and likelihood for development and to examine their proximity to existing environmental justice populations. Impacts on these populations might include long-term impacts on visual setting, increased noise, traffic from drilling and production operations, or potential changes to the social setting of an area should population demographics change as a result of development. Populations living or working near drilling and development could be exposed to hazardous materials or be affected by local air quality. COAs that could be applied at the site-specific level as requirements for future development under any alternative could mitigate some of these impacts on affected populations.

All Navajo Nation Chapters have been identified as populations for further environmental justice consideration. Potential for development in these areas was examined to determine populations where impacts would be more likely to occur. The area of greatest development potential according to the 2019 RFD is in the central-southern portion of the planning area surrounding the Navajo chapters and communities of Nageezi and Counselor (**Appendix I**). High potential areas are also the Huerfano chapter (**Table 3-55**, Fluid Mineral Development Potential in Navajo Nation Chapters). **Figure 3-23**, Oil and Gas Development Potential 2018–2037, overlays identified environmental justice populations in the planning area with areas of high, medium, low, and negligible development potential. Environmental justice populations in areas of high development potential are more likely to be affected. The 2019 RFD predicts each township (a grid of approximately 36 square miles) in this area could have an average development rate of 10 or more oil and gas wells per year over the next 20 years. Environmental justice populations in this area would face a greater chance of exposure to impacts than populations that live outside the area. For comparison, other areas of medium development potential in the planning area would likely have a development rate of 6 to 9 wells per township per year. On average, there would be 2 to 5 wells drilled per year in low-potential areas and less than 1 well per year drilled in townships with negligible potential over the next 20 years. Actual level and rate of development would be impacted by market conditions as well as alternative selected.

The BLM FFO has considered input from all persons or groups regardless of age, income status, race, or other social and economic characteristics. The BLM and the BIA NRO have also consulted with Tribal populations identified as having interest or CIMPPs in the planning area. Consultation history is detailed in

Table 3-55
Fluid Mineral Development Potential in Navajo Nation Chapters

Chapter	High Potential (acres)	Medium Potential (acres)	Low Potential (acres)	Negligible Potential (acres)
Becenti				45,200
Burnham			24,100	
Counselor	43,000	9,200		
Hogback			8,700	
Huerfano	60,000	400	84,600	
Lake Valley		19,800	200	1,600
Nageezi	104,800	55,500	109,800	
Nenahnezad/San Juan			17,300	
Newcomb			600	
Ojo Encino		152,900	14,500	
Pueblo Pintado		91,100	47,000	40,000
Sanostee			86,300	
Torreon/Star Lake			82,400	
Upper Fruitland		27,700	441,700	
White Rock			5,700	28,700
Whitehorse Lake			13,700	8,900

Source: BLM GIS 2019

Chapter 4, Consultation and Coordination. The agencies took into consideration any suggestions made to mitigate the impacts on these populations.

In all future site-specific analyses, the agencies would continue to ensure opportunities for the participation of potentially affected low-income, minority, or Tribal populations. If specific disproportionately high and adverse impacts are identified in subsequent NEPA analyses, the FFO would encourage members of affected populations to provide input on appropriate modifications to avoid or otherwise mitigate effects.

BLM No Action Alternative

Fluid Minerals

Under the BLM No Action Alternative, 1,873,000 acres of BLM fluid minerals would be open for oil and gas leasing and development, including 737,700 acres open to standard terms and conditions (no NSO, CSU or TL). The types of impacts on environmental justice populations under the BLM No Action Alternative would be the same as those described in other resource analyses for the general population, however environmental justice populations are at a greater risk for impacts due to disparities in these populations as described above under *Affected Environment* and in the *Affected Environment Supplemental Report*, Section AE.5.3.

BLM Alternative A

Fluid Minerals

Under BLM Alternative A, there would be five times more acreage closed to fluid mineral leasing when compared with the BLM No Action Alternative. Additionally, under BLM Alternative A, the areas open to fluid mineral leasing with standard terms would decrease by 67 percent and the areas with NSO stipulations for fluid mineral leasing would increase by 12 times (1,138 percent) when compared with the No Action Alternative.

The types of impacts on environmental justice populations under BLM Alternative A would be the same as described above in *Impacts Common to All BLM Alternatives*. Because more acreage would be closed to fluid mineral leasing and areas with NSO stipulations would increase, BLM Alternative A could result in a lower

potential for impacts on all populations, including environmental justice population, when compared with the BLM No Action Alternative.

BLM Alternative B (Including BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

Fluid Minerals

When compared with the BLM No Action Alternative, the areas open to fluid mineral leasing under BLM Alternative B would be reduced by 49 percent. Further, under BLM Alternative B, areas open to fluid mineral leasing with standard terms and conditions would decrease by 74 percent and areas open to fluid mineral leasing with NSO stipulations would increase by seven times when compared with the BLM No Action Alternative.

The types of impacts on environmental justice populations under BLM Alternative B would be the same as described above in *Impacts Common to All BLM Alternatives*. Due to the reductions in areas open to fluid mineral leasing and the increases in NSO stipulations for fluid mineral leasing, BLM Alternative B could result in a lower potential for impacts on environmental justice populations when compared with the BLM No Action Alternative.

BLM Alternative C (Includes BLM Sub-Alternatives C1–C6; applying only to Fluid Minerals)

Fluid Minerals

The types of impacts on environmental justice populations under BLM Alternative C would be the same as described in *Impacts Common to All BLM Alternatives*.

As described in **Table 2-1**, Comparative Summary of BLM Alternatives (Acres), BLM Alternative C includes six sub-alternatives that propose varied fluid mineral leasing management. The areas open to fluid mineral leasing under BLM Sub-Alternatives C1–C5 are the same as the BLM No Action Alternative, while under BLM Sub-Alternative C6 there is a 2 percent reduction. Additionally, when compared with the BLM No Action Alternative, the areas open to leasing with CSU stipulations would increase by 3 percent and remain the same for areas with TL stipulations under all BLM Alternative C sub-alternatives.

BLM Sub-Alternative C1

When compared with the BLM No Action Alternative, the acreage open for leasing under standard terms and conditions under BLM Sub-Alternative C1 would be reduced by 7 percent, and areas with NSO stipulations would increase by 60 percent. Because areas with NSO stipulations for fluid mineral leasing would increase while areas open for leasing with standard terms would decrease, BLM Sub-Alternative C1 could result in a lower potential for impacts on environmental justice populations compared with the BLM No Action Alternative. It should be noted, however, that these NSO stipulations around the CCNHP under BLM Sub-Alternative C1 are mostly areas of negligible or low potential for fluid mineral development in the southwest portion of the planning area, primarily within the Navajo Nation Chapters of Becenti, Pueblo Pintado, Lake Valley, and Nageezi, therefore the practical limitations on development and related impacts under current technology and market conditions may be minimal.

BLM Sub-Alternative C2

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C2 would be reduced by 10 percent, and areas with NSO stipulations would increase by 93 percent. Given the increase in areas with NSO stipulations for fluid mineral leasing and decrease in areas open for leasing with standard terms, BLM Sub-Alternative C2 could result in a lower potential for impacts on environmental justice populations compared with the BLM No Action Alternative. These NSO stipulations around the CCNHP under BLM Sub-Alternative C2 are areas within the Navajo Nation Chapters of Becenti, Pueblo Pintado, Lake Valley, and Nageezi. Overall, the types of impacts under BLM Sub-Alternative C2 would be similar to those described under BLM Sub-Alternative C1.

BLM Sub-Alternative C3

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C3 would be reduced by 14 percent, and areas with NSO stipulations would increase by 133 percent. Because areas with NSO stipulations for fluid mineral leasing would increase while areas open for leasing with standard terms would decrease, BLM Sub-Alternative C3 could result in a lower potential for impacts on environmental justice populations compared with the BLM No Action Alternative. These NSO stipulations around the CCNHP under BLM Sub-Alternative C3 are areas within the Navajo Nation Chapters of Becenti, Pueblo Pintado, Lake Valley, and Nageezi. Overall, the types of impacts under BLM Sub-Alternative C3 would be similar to those described under BLM Sub-Alternative C1.

BLM Sub-Alternative C4

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C4 would be reduced by 19 percent, and areas with NSO stipulations would increase by 188 percent. Given the increase in areas with NSO stipulations for fluid mineral leasing and decrease in areas open for leasing with standard terms, BLM Sub-Alternative C4 could result in a lower potential for impacts on environmental justice populations compared with the BLM No Action Alternative. These NSO stipulations around the CCNHP under BLM Sub-Alternative C4 are areas within the Navajo Nation Chapters of Becenti, Pueblo Pintado, Lake Valley, Nageezi, White Rock, and Counselor. Overall, the types of impacts under BLM Sub-Alternative C4 would be similar to those described under BLM Sub-Alternative C1.

BLM Sub-Alternative C5

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C5 would be reduced by 24 percent, and areas with NSO stipulations would increase by 253 percent. Because of these changes to areas open to fluid mineral leasing with standard terms and conditions or NSO stipulations, BLM Sub-Alternative C5 could result in a lower potential for impacts on environmental justice populations compared with the BLM No Action Alternative. These NSO stipulations around the CCNHP under BLM Sub-Alternative C5 are areas within the Navajo Nation Chapters of Becenti, Pueblo Pintado, Lake Valley, Nageezi, Counselor, and Whitehorse Lake. Overall, the types of impacts under BLM Sub-Alternative C4 would be similar to those described under BLM Sub-Alternative C1.

BLM Sub-Alternative C6

When compared with the BLM No Action Alternative, the areas closed to leasing under BLM Sub-Alternative C6 decreases by 1.2 percent due to a leasing closure from 0-4 miles around the CCNHP. Additionally, the areas open to fluid mineral leasing with standard terms and conditions under BLM Sub-Alternative C6 would be reduced by 16 percent, and areas with NSO stipulations would increase by 57 percent. Because of these changes to areas open to fluid mineral leasing, including those areas open to fluid mineral leasing with standard terms and conditions or NSO stipulations, BLM Sub-Alternative C6 could result in a lower potential for impacts on environmental justice populations compared with the BLM No Action Alternative. The leasing closures would occur in areas within the Navajo Nation Chapters of Lake Valley, Pueblo Pintado, and Nageezi. The NSO stipulations would occur on lands within the Navajo Nation Chapters of Becenti and White Rock. Overall, the types of impacts under BLM Sub-Alternative C6 would be similar to those described under BLM Sub-Alternative C1.

BLM Alternative D

Fluid Minerals

The areas open to fluid mineral leasing under BLM Alternative D is the same the BLM No Action Alternative. When compared with the BLM No Action Alternative, under BLM Alternative D there is an increase of 4 percent in areas open to leasing with standard terms and reduction of 51 percent in areas open to leasing with NSO stipulations. The types of impacts on environmental justice populations under BLM Alternative D would be the same as described in *Impacts Common to All BLM Alternatives*. In general, BLM Alternative D

would result in similar potential for impacts on all populations, including environmental justice populations, when compared with the BLM No Action Alternative.

BIA Alternatives

Impacts Common to All BIA Alternatives

Similar to impacts common to all BLM alternatives, impacts common to all BIA alternatives on environmental justice populations in the decision area could be from human health, air quality, water quality, traditional cultural ways of life, social, and economic impacts. These impacts would be the same as those described under the relevant analysis for those resources for the general population; however, environmental justice populations are at a greater risk for impacts due to disparities in these populations as described in the Affected Environment Supplemental Report, Section AE.5.3.

The extent to which existing minority, low-income, or Tribal populations are disproportionately affected by high and adverse human health or environmental impacts depends on whether environmental justice populations are more likely to be exposed to such impacts or are more vulnerable to these impacts. The exact level and intensity of impacts cannot be determined in the context of the FMG RMPA/EIS. That is because there is insufficient information on future site-specific well locations at this planning level. The degree to which any implementation impacts would disproportionately or adversely affect low-income, minority, or Tribal populations would be determined at the site-specific scale in future NEPA analyses.

Under all BIA alternatives, additional surface disturbance from oil and gas development in the BIA mineral decision area is projected as shown in **Table 3-1**, RFD Projections by Alternative.

BIA No Action Alternative

Any impacts that would be incurred by the general population under the BIA No Action Alternative, as described in other resource sections, would also be impacts on environmental justice populations under the BIA No Action Alternative; however, environmental justice populations are at a greater risk for impacts due to disparities in these populations as described in the Affected Environment Supplemental Report, Section AE.5.3.

Additional impacts under the BIA No Action Alternative could include human health and safety impacts. A lease stipulation on individual Indian allotments would allow the lessor to use gas free of charge for primary dwelling utilities by accessing leased wells. This could have human health and safety impacts on individual Indian allotment lessors; impacts include the potential for gas leaks inside the dwelling that are less detectable due to the unprocessed, non-odorized natural gas being piped directly from the well. Further, if there is an emergency in the producing well, the gas line could spread the emergency to the dwelling.

BIA Alternative A

Impacts that would be incurred by the general population under BIA Alternative A, as described in other resource sections, would also be impacts on environmental justice populations under BIA Alternative A; however, environmental justice populations are at a greater risk for impacts due to disparities in these populations. There could be additional impacts under BIA Alternative A. For example, a lease stipulation on individual Indian allotments that would remove the lessor's right to use gas free of charge could have impacts on individual Indian allotment lessors. The remoteness of some occupied dwellings might make it difficult to gain access to other commercial energy sources for the dwelling. Moreover, it may place additional cost burdens on the lessor for obtaining an alternative or commercial energy source that did not previously exist.

Under BIA Alternative A, impacts could include new or additional monetary compensation for Navajo surface landowners when surface use from development occurs on lands, including grazing lands.

BIA Alternative B

Impacts that would be incurred by the general population under BIA Alternative B, as described in other resource sections, would also affect environmental justice populations; however, environmental justice

populations are at a greater risk for impacts due to disparities in these populations. Additional impacts on environmental justice populations under BIA Alternative B would be the same as the additional impacts under BIA Alternative A.

BIA Alternative C

Impacts that would be incurred by the general population under BIA Alternative C, as described in other resource sections, would also affect environmental justice populations; however, environmental justice populations are at a greater risk for impacts due to disparities in these populations. Additional impacts on environmental justice populations under BIA Alternative C would be the same as additional impacts under BIA Alternative A.

BIA Alternative D

Impacts that would be incurred by the general population under BIA Alternative D, as described in other resource sections, would also affect environmental justice populations; however, environmental justice populations are at a greater risk for impacts due to disparities in these populations. Additional impacts on environmental justice populations under BIA Alternative D would be the same as additional impacts described under BIA Alternative A, except on Tribal trust and individual Indian allotments.

On individual Indian allotments, under BIA Alternative D, a lessee, through agreement with the landowner, would determine how to best maintain roads to prevent erosion. This stipulation would allow landowners to maintain these roads for land access after production has ended instead of letting them be reclaimed. This would result in impacts such as increased access to sites, residences, resources, and recreation.

On Tribal trust lands and individual Indian allotments, lessees would be able to site wells much closer to structures than on other BIA-managed surface lands. A closer placement of wells to structures, such as dwellings, would potentially allow for increased impacts on residents of those structures, such as health and human safety impacts, noise pollution, and decreased air quality.

Cumulative Impacts

Oil and gas development projects, when combined with other industrial projects in the planning area, could cumulatively affect identified environmental justice populations throughout the planning area.

Contributions to cumulative impacts would vary by alternative due to the level of proposed development, but all BLM and BIA alternatives could result in cumulative impacts. Due to the uncertainty in specific development locations, the level of contributions to cumulative impacts under each alternative is uncertain. Further site-specific analysis would be required at the project level, leasing and APD phases. This analysis would include an additional examination of the site-specific impacts of management actions on low-income, minority, and Tribal populations.

3.7.4 Public Health and Safety

Affected Environment

Current Conditions

Topics of recent and growing public concern, both nationally and in the decision area, include hydraulic fracturing to enhance the recovery of natural gas and associated liquid hydrocarbons. Another topic of concern is emissions to the atmosphere of natural gas (methane) and other gaseous constituents.

Oil and gas production poses the risk of spills or accidental release of contaminants during the production and transport of natural gas, condensate, and produced water. Companies are responsible for understanding and abiding by all applicable hazardous materials transportation laws and regulations contained in 49 CFR Parts 100-180. There is a potential for a pipeline carrying natural gas, liquid condensate, or produced water to develop leaks or ruptures during natural gas extraction, transport, and processing. Data from the US Department of Transportation indicate that an average of one rupture annually should be expected for every

5,000 miles of pipeline (Office of Pipeline Safety 2005). In addition to pipelines, there is a risk of ruptures of and releases from storage tanks and barrels.

More than 50 percent of pipeline ruptures occur as a result of heavy equipment striking the pipeline. Such ruptures could cause a fire or explosion if a spark or open flame were to ignite the natural gas escaping from the pipeline. Pipeline design, materials, maintenance, and abandonment procedures are required to meet the standards set forth in US Department of Transportation regulations (49 CFR 192, Transportation of Natural Gas by Pipelines). Oil owners and operators are required to maintain and implement spill prevention, control, and countermeasure plans, including cleanup and mitigation measures as required by the BLM or the state.

Public concern about the use of hydraulic fracturing has been focused on the potential for contamination of freshwater aquifers and impacts on domestic and municipal water wells.

An associated concern has involved the potential for mini-earthquakes caused by the creation of enough pressure in the formation to cause fractures. For decades, oil and gas companies and independent geophysicists have used state-of-the-art equipment to monitor microseismic activity—defined as a faint or very slight tremor—during hydraulic fracturing to optimize well completions and to gather information about fracture dimensions and propagation (Warpinski 2011). These data give an indication about the magnitude of seismic activity associated with hydraulic fracturing, the dimensions of resultant fractures in geologic formations, and the probability for induced fractures to extend into nearby aquifers, if present.

Research indicates that microseismic activity created by hydraulic fracturing occurs at Richter magnitude 1.0 or less (Warpinski and Zimmer 2012). In comparison, a magnitude 3.0 earthquake is the threshold that can be felt at the ground surface. The Richter magnitude scale is base-10 logarithmic, meaning that a magnitude 1.0 tremor is 1/10th the energy of a magnitude 2.0 tremor.

The National Academy of Sciences reviewed more than 100,000 oil and gas wells and wastewater disposal wells around the world and concluded that “incidences of felt induced seismicity appear to be very rare,” with only one such documented occurrence (National Academy of Sciences 2012).

In addition to vertical separation of several thousand feet between the upper extent of fractures and freshwater aquifers, the BLM imposes requirements for proper casing and cementing of wellbores to isolate the aquifers penetrated by a wellbore. The BLM requires that the surface casing be set from 800 to 1,500 feet deep, based on a geological review of the formations, aquifers, and groundwater. Cement is then pumped into the space between the casing and surrounding rock to prevent fluids from moving up the wellbore and casing annulus and coming in contact with shallow rock layers, including freshwater aquifers.

BLM petroleum engineers review well and cement design and final drilling and cementing logs to ensure that the cement has been properly placed. When penetration of groundwater and freshwater aquifers is anticipated, BLM inspectors may witness the cementing of surface casing and subsequent pressure testing to ensure that the annular space between the casing and borehole wall is properly sealed.

No single list of chemicals currently used in hydraulic fracturing exists for the planning area, and the exact combinations and ratios used by operators are considered proprietary; however, the general types of compounds and relative amounts used are well known and relatively consistent (see **Table 3-56**). Since fracture jobs are tailored to the downhole environment and companies are aware of the concerns involving hydraulic fracturing, the chemicals listed in **Table 3-56** may or may not be used, and the information is provided solely as general information.

Although a variety of chemical additives is used in hydraulic fracturing, the vast bulk of fluid injected into the formation during the process is water, mixed with sand. This represents 99.51 percent of the total by volume in the typical mixture shown in **Table 3-56**. The sand is used as a propping agent to help keep the newly formed fractures from closing.

Table 3-56
Typical Hydrofracturing Chemical Additives

Additive Type¹	Typical Example¹	Percent by Volume²	Function¹	Common Use of Example Compound
Acid	Hydrochloric acid	0.123	Dissolves minerals and initiates cracks in the rock	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	0.001	Eliminates bacteria in the water that produces corrosive by-products	Disinfectant; sterilizer for medical and dental equipment
Breaker	Ammonium persulfate	0.010	Allows delayed breakdown of the gel	Used in hair coloring, as a disinfectant, and in manufacture of household plastics
Clay stabilizer	Potassium chloride	0.060	Creates a brine carrier fluid that prohibits fluid interaction with formation clays	Used in low-sodium table salt substitutes, medicines, and intravenous fluids
Corrosion inhibitor	Formic acid	0.002	Prevents corrosion of the pipe	Used as a preservative in livestock feed and as a lime remover in toilet bowl cleaners
Crosslinker	Borate salts	0.007	Maintains fluid viscosity as temperature increases	Used in laundry detergents, hand soaps, and cosmetics
Friction reducer	Polyacrylamide	0.088	"Slicks" the water to minimize friction	Used as a flocculent in water treatment and manufacture of paper
Gelling agent	Guar gum	0.056	Thickens the water to help suspend the sand	Used as a thickener, binder, or stabilizer in foods
Iron control	Citric acid	0.004	Prevents precipitation of metal oxides	Used as flavoring agent or preservative in foods
Surfactant	Lauryl sulfate	0.085	Increases the viscosity of the fracture fluid	Used in soaps, shampoos, and detergents and as a foaming agent
pH adjusting agent	Sodium hydroxide, acetic acid	0.011	Adjusts pH of fluid to maintain the effectiveness of other components, such as crosslinkers	Sodium hydroxide used in soaps and drain cleaners; acetic acid used as a chemical reagent and main ingredient of vinegar
Scale inhibitor	Sodium polycarboxylate	0.043	Prevents scale deposits in the pipe	Used in dishwashing liquids and other cleaners
Winterizing agent	Ethanol, isopropyl alcohol, methanol	–	Added as a stabilizer, drier, and anti-freezing agent	Various cosmetic, medicinal, and industrial uses
Total Additives	–	0.49	–	–
Total Water and Sand	–	99.51	–	–

Sources: ¹FracFocus Chemical Disclosure Registry, fracfocus.org/chemical-use/what-chemicals-are-used; ²US Department of Energy 2009

Following completion of fracturing activities, the pressure differential between the formation and the borehole (a result of the weight of thousands of feet of rock above the formation) causes most of the injected fluids to flow toward the borehole. Then it flows upward to the surface, along with the hydrocarbon fluids released from the formation. The composition of this mixture, called flowback water, gradually shifts over several days to a few months, as injected fluids that have not yet migrated back to the wellbore or reacted with the native rock are carried out of the formation.

Although public awareness of hydraulic fracturing has heightened public concern about contaminating freshwater aquifers and water wells, similar concerns have been expressed more generally in relation to oil and gas developments. A white paper by Witter et al. (2008; not peer reviewed) addressed the chemicals used or produced during oil and gas development but made little reference to health or environmental statistics; however, the authors did note two situations relative to environmental exposures.

One was the reported occurrence of detectable levels of methane in 135 of 184 water wells, springs, seeps, ponds, and rivers sampled during a groundwater investigation conducted for Garfield County, Colorado, in 2006 (Papadopoulos 2007). That study noted that methane may have been present due to natural levels in some of the bedrock formations penetrated by the water wells or recharging the seeps, springs, and surface water, and that it may also be generated by a natural (bacterial) process in the water wells. Witter et al. (2008) could not identify the sources of methane; because of this, they were unable to conclude whether any of the methane in wells and natural water bodies sampled by Papadopoulos (2007) resulted from oil and gas-related activities or from secondary generation of methane by natural bacterial processes unrelated to oil and gas.

The conclusions that the EPA made in *Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States* (EPA 2016b) about the more severe impacts that could occur during the hydraulic fracturing process are as follows:

- Water withdrawals for hydraulic fracturing in times or areas of low water availability, particularly in areas with limited or declining groundwater resources
- Spills during the management of hydraulic fracturing fluids and chemicals or produced water that result in large volumes of high concentrations of chemicals reaching groundwater resources
- Injection of hydraulic fracturing fluids into wells with inadequate mechanical integrity, allowing gases or liquids to move to groundwater resources
- Injection of hydraulic fracturing fluids directly into groundwater resources
- Discharge of inadequately treated hydraulic fracturing wastewater to surface water resources
- Disposal or storage of hydraulic fracturing wastewater in unlined pits, resulting in contamination of groundwater resources

If impacts from the hydraulic fracturing water cycle occur, depending on the severity of the impact, drinking water resources may become unusable for consumption by humans or wildlife, and may negatively affect fish and vegetation.

Measures that the BLM currently requires for protecting groundwater aquifers, water wells, and surface waters include isolating deeper, hydrocarbon-producing horizons from shallower bedrock and alluvial layers that communicate with surface waters and within which freshwater wells are completed. Examples are to require the following:

- That casings be set to a depth below the deepest freshwater aquifer encountered and water wells in the vicinity
- That the casing be cemented to prevent flow of saline waters, natural gas, and associated fluids moving up the borehole from coming in contact with the freshwater zones

In general, the BLM requires surface casing to be deeper than the deepest water wells in the area. Water samples taken from public water faucets as part of the Counselor Chapter’s health impact assessment did not detect any contaminants at levels violating EPA water quality standards (Counselor Health Impact Assessment Committee 2017). **Section 3.4.3**, Water Resources, provides more information about the sampling results. Because the method for conducting the sampling was not provided, it is difficult to evaluate the conclusions.

Air sampling conducted as part of the Counselor Chapter’s health impact assessment found levels of hydrogen sulfide to be above the EPA reference level for long-term exposure at one location. The air sampling also detected other airborne chemicals, including toluene, ethyl acetate, A-pinene, and propane, at levels that did not pose a risk to human health. Because the method for conducting the sampling was not provided, it is difficult to evaluate the conclusions (Counselor Health Impact Assessment Committee 2017).

During the scoping phase of the FMG RMPA/EIS, commenters raised concerns about increased vehicular traffic associated with energy development in the planning area. Vehicles traveling to well sites during construction and operation share public roads with passenger vehicles and school buses and cause additional wear on road surface bridges.

Table 3-57 displays crash data for the counties in the planning area. Currently, heavy vehicles comprise a relatively small portion of the vehicles in crashes.

Commenters also raised concerns regarding the damage that increased vehicular traffic associated with energy development can have on roads. **Table 3-58** displays the distribution of contributing factors by county in 2016. Compared with certain other contributing factors, especially human factors, road defects were identified as a contributing factor in vehicle crashes in a relatively small number of instances.

Table 3-57
Vehicle Crashes by Vehicle Type (2012–2016 5-Year Average)

Vehicle Type	San Juan County	Rio Arriba County	McKinley County	Sandoval County
Bus	1	4	4	10
Motorcycle	5	21	19	56
Passenger	175	484	860	1,536
Pedal cyclist	1	1	5	11
Pedestrian	3	5	33	11
Pickup	140	242	555	492
Semi	18	28	151	69
Van/SUV/4WD	77	170	387	592
Other vehicle	3	13	29	52
Missing data	61	104	184	180
Total vehicles	484	1,072	2,227	3,009

Source: (New Mexico Department of Transportation) NMDOT 2017a, 2017b, 2017c, and 2017d

Table 3-58
Frequency of Contributing Factors in Vehicle Crashes (2016)

Contributing Factor	San Juan County	Rio Arriba County	McKinley County	Sandoval County
Human	2,698	1,142	2,045	2,667
Vehicle defect	46	21	48	47
Environment	0	7	1	0
Road defect	4	5	14	8
Other	1,615	626	997	1,612

Source: NMDOT 2017a, 2017b, 2017c, and 2017d

Note: Multiple contributing factors may be reported for any vehicle in a crash.

Population changes related to energy and mineral development may result in changes to the crime rate. Public safety concerns related to crime rates are provided in the Affected Environment Supplemental Report, Section AE.5.2, Social and Economic Considerations.

Trends

Public health and safety concerns associated with energy development are expected to continue to increase.

Between 2007 and 2016, the trend in total number of vehicle crashes per year was as follows:

- San Juan County—downward (-101 crashes per year)
- Rio Arriba County—upward (+11 crashes per year)
- McKinley County—upward (+9 crashes per year)
- Sandoval County—downward (-36 crashes per year)

Environmental Consequences

BLM Alternatives

Impacts Common to All BLM Alternatives

The 2019 RFD projected that, for future well drilling, the proportion of horizontal to vertical wells is expected to remain the same under all alternatives; thus, health impacts due to well type are not projected to be different across alternatives.

Additionally, under all BLM alternatives, fluid mineral leasing and subsurface development in areas of NSO or CSU stipulations could indirectly affect CIMPPs and diminish the ability of Tribes to conduct ceremonies or otherwise use these cultural resources, which could impact the mental well-being of certain Tribal members as described by Begay (2001).

Under all BLM alternatives, risks to public health and safety would increase from current levels. This is due to the increased oil and gas development projected to occur in the planning area (**Appendix I**). The rate of spills and releases of hazardous chemicals, such as H₂S and benzene, is expected to increase with increased production. Exposure to H₂S primarily occurs through inhalation, and symptoms of acute exposure can include irritation of the nose and throat, shortness of breath, nausea, headaches, delirium, disturbed equilibrium, tremors, convulsions, and skin and eye irritation (Agency for Toxic Substances and Disease Registry [ATSDR] 2014). Repeated or prolonged exposure has been reported to cause low blood pressure, headache, nausea, loss of appetite, weight loss, ataxia, eye-membrane inflammation, and chronic cough (ATSDR 2014). Acute benzene exposure can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, coma, and death, while long-term exposure is known to cause certain types of cancer (ATSDR 2015). As a result, the Occupational Safety and Health Administration (OSHA) has set regulations related to limiting and monitoring H₂S exposure (OSHA 2018); however, alternatives that result in increased production compared with the BLM No Action Alternative are thus expected to result in increased risks to public health and safety.

Under all alternatives, increased rates of development over the current rate could result in an increase in the crime rate in the area.

Vegetation Management

Under all alternatives, vegetation treatments could include prescribed fire and selective herbicides. There is a possibility that prescribed fire could escape containment and spark a wildland fire. If spilled or used improperly, herbicides could contaminate water or food products, causing health risks. Under all alternatives, the BLM would take steps to reduce the health risks of herbicides used for vegetation treatments. These steps would include using only herbicides registered with the EPA and supported by scientific evaluation and NEPA documentation. The BLM would also abide by Tribal, state, and local bans on particular herbicides. The levels of use of prescribed fire and herbicides are not expected to significantly vary by alternative; thus, public health and safety impacts of vegetation treatment are expected to be the same under all alternatives.

Lands with Wilderness Characteristics

There would be no discernable impacts on public health and safety through designation of lands with wilderness characteristics.

BLM No Action Alternative

Lands and Realty

Under this alternative, ROWs would continue to be managed on a case-by-case basis. The BLM could continue to use its discretion to relocate ROWs as needed to protect public health and safety.

Fluid Minerals

The current management would be continued under the BLM No Action Alternative. Lessees are responsible for complying with all applicable laws and regulations. Under this alternative, approximately 107,800 acres would be closed to leasing; an additional 84,100 acres would be subject to NSO stipulations. Persons residing in or near closed and NSO areas would be protected from some health and safety impacts, such as noise and light impacts from surface facilities, but would be exposed to other impacts such as increased traffic, and air and water pollution. The 2019 RFD projects that under this alternative, approximately 1,873 new wells would be drilled on federal mineral estate over the next 20 years (**Appendix I**).

BLM Alternative A

The focus of management actions and stipulations under this alternative on protecting natural ecosystems by concentrating development away from lands with wilderness characteristics and wildlife areas could be expected to result in a concentration of development closer to communities and sensitive health receptors; however, reduced impacts on public health and safety compared with the BLM No Action Alternative would still be expected.

Lands and Realty

Under this alternative, 28,800 acres would be managed as ROW exclusion areas, and 1,060,400 acres would be managed as ROW avoidance areas. This could reduce the mileage of new roads compared with the BLM No Action Alternative, resulting in reduced traffic impacts. Managing as ROW avoidance within 1,320 feet (0.25 miles) of community and residential structures would particularly reduce localized noise, light, traffic, and other health impacts in these commonly used areas.

Fluid Minerals

Under this alternative, approximately 542,900 acres would be closed to leasing; an additional 1,039,800 acres would be subject to NSO stipulations. Persons residing in or near closed and NSO areas would generally be protected from some health and safety impacts, such as noise and light impacts. The NSO stipulation within 1,320 feet (0.25 miles) of community and residential structures would particularly reduce localized noise, light, and other health impacts in these commonly used areas. Where localized impacts are reduced, people would still be exposed to impacts that spread over a wider area, such as increased traffic and potential air and water pollution.

The additional closures and stipulations under this alternative would provide additional protections to public health and safety compared with the BLM No Action Alternative. The reduced number of wells projected under this alternative compared with the BLM No Action Alternative would result in a reduced number of spills and reduced levels of air emissions, noise and light pollution, and traffic across the planning area (see **Table 3-1**, RFD Projections by Alternative).

BLM Alternative B (Includes BLM Sub-Alternatives B1 and B2; applying only to Fluid Minerals)

The focus of management actions and stipulations under this alternative on protecting cultural resources by concentrating development away from the CCNHP and known cultural and historic properties could be expected to result in a concentration of development closer to communities and sensitive health receptors;

however, reduced impacts on public health and safety compared with the BLM No Action Alternative would still be expected.

Lands and Realty

Under this alternative, 24,800 acres would be managed as ROW exclusion areas, and 956,100 acres would be managed as ROW avoidance areas. This could reduce the mileage of new roads compared with the BLM No Action Alternative, resulting in reduced traffic impacts. Managing as ROW avoidance within 1,320 feet (0.25 miles) of community and residential structures would reduce impacts as described under BLM Alternative A.

Fluid Minerals

The additional closures and stipulations under this alternative would provide additional protections to public health and safety compared with the BLM No Action Alternative. The reduced number of wells projected under this alternative and sub-alternatives, compared with the BLM No Action Alternative, would result in a reduced potential for spills and reduced levels of air emissions, noise and light pollution, and traffic across the planning area (see **Table 3-1**, RFD Projections by Alternative).

BLM Sub-Alternative B1

Under BLM Sub-Alternative B1, approximately 726,500 acres would be closed to leasing; an additional 588,900 acres would be subject to NSO stipulations. Persons residing in closed and NSO areas would be protected from localized impacts but still subject to more generalized impacts as described under Alternative A. The NSO stipulation within 1,320 feet (0.25 miles) of community and residential structures would reduce impacts as described under BLM Alternative A.

BLM Sub-Alternative B2

Under BLM Sub-Alternative B2, approximately 825,700 acres would be closed to leasing; an additional 548,000 acres would be subject to NSO stipulations. Persons residing in closed and NSO areas would be protected from localized impacts but still subject to more generalized impacts as described under Alternative A. The NSO stipulation within 1,320 feet (0.25 miles) of community and residential structures would reduce impacts as described under BLM Alternative A.

BLM Alternative C (Includes BLM Sub-Alternatives C1–C6; applying only to Fluid Minerals)

The focus of management actions and stipulations under this alternative on balancing community needs and development by concentrating development away from communities, dwellings, schools, and reservoirs could be expected to result in reduced impacts on public health and safety compared with the BLM No Action Alternative.

Lands and Realty

Under this alternative, 2,800 acres would be managed as ROW exclusion areas, and 5,900 acres would be managed as ROW avoidance areas. This could slightly reduce the mileage of new roads compared with the BLM No Action Alternative, resulting in reduced traffic impacts. Managing as ROW avoidance within 656 feet (200 meters) of community and residential structures would reduce localized noise, light, traffic, and other health impacts in these commonly used areas compared with the BLM No Action Alternative.

Fluid Minerals

The additional closures and stipulations under this alternative would provide additional protections to public health and safety compared with the BLM No Action Alternative.

The slightly reduced number of wells projected under this alternative compared with the BLM No Action Alternative would result approximately the same number of projected spills and approximately the same levels of air emissions, noise and light pollution, and traffic across the planning area (see **Table 3-1**, RFD Projections by Alternative).

BLM Sub-Alternative C1

When compared with the BLM No Action Alternative, the acreage open for leasing under standard terms and conditions under BLM Sub-Alternative C1 would be reduced by 7.1 percent, and areas with NSO or CSU stipulations would increase by 59.8 percent. The types of impacts on Public Health and Safety under BLM Sub-Alternative C1 would be the same as described in the No Action Alternative. Because areas with NSO and CSU stipulations for fluid mineral leasing would increase while areas open for leasing with standard terms would decrease, BLM Sub-Alternative C1 could result in a lower potential for impacts on Public Health and Safety compared with the BLM No Action Alternative. It should be noted, however, that these NSO stipulations around the CCNHP under BLM Sub-Alternative C1 are mostly areas of negligible or low potential for fluid mineral development in the southwest portion of the planning area, primarily within the Navajo Nation Chapters of Becenti, Pueblo Pintado, Lake Valley, and Nageezi, therefore the practical limitations on development and related impacts under current technology and market conditions may be minimal.

Under this alternative, as under the BLM No Action Alternative, approximately 107,800 acres would be closed to leasing; an additional 134,400 acres would be subject to NSO stipulations.

Persons residing in or near closed and NSO areas would be protected from localized impacts but still subject to more generalized impacts as described under Alternative A. The NSO stipulation within 3,696 feet (0.7 miles) of community and residential structures would reduce localized noise, light, and other health impacts in these commonly used areas to the greatest extent of any BLM alternative.

Under this alternative, additional NSO stipulations would be applied within 2 miles around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola, for 1 mile around other Chacoan outliers, for 0.5 miles on either side of the ACEC boundary for Chacoan road ACECs, including the North Road ACEC and Ah-shi-sle-pah Road ACEC, and for 0.75 miles on either side of the center line of designated Chacoan roads that are not in ACECs. These stipulations would provide additional protections from surface impacts in these areas compared with the BLM No Action Alternative.

BLM Sub-Alternative C2

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C2 would be reduced by 10.4 percent, and areas with NSO stipulations would increase by 92.5 percent. Overall, the types of impacts under BLM Sub-Alternative C2 would be similar to those described under BLM Sub-Alternative C1.

Under this alternative, as under the BLM No Action Alternative, approximately 107,800 acres would be closed to leasing; an additional 134,400 acres would be subject to NSO stipulations.

Persons residing in or near closed and NSO areas would be protected from localized impacts but still subject to more generalized impacts as described under Alternative A. The NSO stipulation within 3,696 feet (0.7 miles) of community and residential structures would reduce localized noise, light, and other health impacts in these commonly used areas to the greatest extent of any BLM alternative.

The additional closures and stipulations under this alternative would provide additional protections to public health and safety compared with the BLM No Action Alternative. The slightly reduced number of wells projected under this alternative compared with the BLM No Action Alternative would result approximately the same number of spills and approximately the same levels of air emissions, noise and light pollution, and traffic across the planning area (see **Table 3-1**, RFD Projections by Alternative).

The focus of management actions and stipulations under this alternative on balancing community needs and development by concentrating development away from communities, dwellings, schools, and reservoirs could be expected to result in reduced impacts on public health and safety compared with the BLM No Action Alternative.

Under this alternative additional NSO stipulations would be applied within 4 miles around the CCNHP boundary and the boundaries of Pueblo Pintado and Bineola, for 1 mile around other Chacoan outliers, for 0.5 miles on either side of the ACEC boundary for Chacoan road ACECs, including the North Road ACEC and Ah-shi-sle-pah Road ACEC, and for 0.75 miles on either side of the center line of designated Chacoan roads that are not in ACECs. These stipulations would provide additional protections from surface impacts in these areas compared with the BLM No Action Alternative.

BLM Sub-Alternative C3

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C3 would be reduced by 14.1 percent, and areas with NSO stipulations would increase by 133.1 percent. Overall, the types of impacts under BLM Sub-Alternative C3 would be similar to those described under BLM Sub-Alternative C1.

Under this alternative, as under the BLM No Action Alternative, approximately 107,800 acres would be closed to leasing; an additional 134,400 acres would be subject to NSO stipulations. Persons residing in or near closed and NSO areas would be protected from localized impacts but still subject to more generalized impacts as described under Alternative A. The NSO stipulation within 3,696 feet (0.7 miles) of community and residential structures would reduce localized noise, light, and other health impacts in these commonly used areas to the greatest extent of any BLM alternative.

The additional closures and stipulations under this alternative would provide additional protections to public health and safety compared with the BLM No Action Alternative. The slightly reduced number of wells projected under this alternative compared with the BLM No Action Alternative would result approximately the same number of spills and approximately the same levels of air emissions, noise and light pollution, and traffic across the planning area (see **Table 3-1**, RFD Projections by Alternative).

The focus of management actions and stipulations under this alternative on balancing community needs and development by concentrating development away from communities, dwellings, schools, and reservoirs could be expected to result in reduced impacts on public health and safety compared with the BLM No Action Alternative.

Under this alternative additional NSO stipulations would be applied within 6 miles around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola, for 1 mile around other Chacoan outliers, for 0.5 miles on either side of the ACEC boundary for Chacoan road ACECs, including the North Road ACEC and Ah-shi-sle-pah Road ACEC, and for 0.75 miles on either side of the center line of designated Chacoan roads that are not in ACECs. These stipulations would provide additional protections from surface impacts in these areas compared with the BLM No Action Alternative.

BLM Sub-Alternative C4

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C4 would be reduced by 19.0 percent, and areas with NSO stipulations would increase by 187.5 percent. Overall, the types of impacts under BLM Sub-Alternative C4 would be similar to those described under BLM Sub-Alternative C1.

Under this alternative, as under the BLM No Action Alternative, approximately 107,800 acres would be closed to leasing; an additional 134,400 acres would be subject to NSO stipulations. Persons residing in or near closed and NSO areas would be protected from localized impacts but still subject to more generalized impacts as described under Alternative A. The NSO stipulation within 3,696 feet (0.7 miles) of community and residential structures would reduce localized noise, light, and other health impacts in these commonly used areas to the greatest extent of any BLM alternative.

The additional closures and stipulations under this alternative would provide additional protections to public health and safety compared with the BLM No Action Alternative. The slightly reduced number of wells projected under this alternative compared with the BLM No Action Alternative would result approximately

the same number of spills and approximately the same levels of air emissions, noise and light pollution, and traffic across the planning area (see **Table 3-1**, RFD Projections by Alternative).

The focus of management actions and stipulations under this alternative on balancing community needs and development by concentrating development away from communities, dwellings, schools, and reservoirs could be expected to result in reduced impacts on public health and safety compared with the BLM No Action Alternative.

Under this alternative additional NSO stipulations would be applied within 8 miles around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola, for 1 mile around other Chacoan outliers, for 0.5 miles on either side of the ACEC boundary for Chacoan road ACECs, including the North Road ACEC and Ah-shi-sle-pah Road ACEC, and for 0.75 miles on either side of the center line of designated Chacoan roads that are not in ACECs. These stipulations would provide additional protections from surface impacts in these areas compared with the BLM No Action Alternative.

BLM Sub-Alternative C5

When compared with the BLM No Action Alternative, the areas open for leasing under standard terms and conditions under BLM Sub-Alternative C5 would be reduced by 24.3 percent, and areas with NSO stipulations would increase by 253.0 percent. Overall, the types of impacts under BLM Sub-Alternative C4 would be similar to those described under BLM Sub-Alternative C1.

Under this alternative, as under the BLM No Action Alternative, approximately 107,800 acres would be closed to leasing; an additional 134,400 acres would be subject to NSO stipulations. Persons residing in or near closed and NSO areas would be protected from localized impacts but still subject to more generalized impacts as described under Alternative A. The NSO stipulation within 3,696 feet (0.7 miles) of community and residential structures would reduce localized noise, light, and other health impacts in these commonly used areas to the greatest extent of any BLM alternative.

The additional closures and stipulations under this alternative would provide additional protections to public health and safety compared with the BLM No Action Alternative. The slightly reduced number of wells projected under this alternative compared with the BLM No Action Alternative would result approximately the same number of spills and approximately the same levels of air emissions, noise and light pollution, and traffic across the planning area (see **Table 3-1**, RFD Projections by Alternative).

The focus of management actions and stipulations under this alternative on balancing community needs and development by concentrating development away from communities, dwellings, schools, and reservoirs could be expected to result in reduced impacts on public health and safety compared with the BLM No Action Alternative.

Under this alternative additional NSO stipulations would be applied within 10 miles around the CCNHP boundary and the boundaries of Pueblo Pintado and Kin Bineola, for 1 mile around other Chacoan outliers, for 0.5 miles on either side of the ACEC boundary for Chacoan road ACECs, including the North Road ACEC and Ah-shi-sle-pah Road ACEC, and for 0.75 miles on either side of the center line of designated Chacoan roads that are not in ACECs. These stipulations would provide additional protections from surface impacts in these areas compared with the BLM No Action Alternative.

BLM Sub-Alternative C6

When compared with the BLM No Action Alternative, the areas open for leasing under BLM Sub-Alternative C6 are reduced by 2.4 percent. Additionally, the areas under standard terms and conditions under BLM Sub-Alternative C6 would be reduced by 14.1 percent, and areas with NSO stipulations would increase by 87.0 percent. Overall, the types of impacts under BLM Sub-Alternative C6 would be similar to those described under BLM Sub-Alternative C1.

BLM Alternative D

Lands and Realty

Under this alternative, 2,800 acres would be managed as ROW exclusion areas, and 5,900 acres would be managed as ROW avoidance areas. This could slightly reduce the mileage of new roads compared with the BLM No Action Alternative, resulting in reduced traffic impacts.

Fluid Minerals

Under this alternative, as under the BLM No Action Alternative, approximately 107,800 acres would be closed to leasing; an additional 41,600 acres would be subject to NSO stipulations. Persons residing in or near closed and NSO areas would be protected from localized impacts but still subject to more generalized impacts as described under Alternative A. The NSO stipulation within 656 feet (200 meters) of community and residential structures would reduce localized noise, light, and other health impacts in these commonly used areas compared with the BLM No Action Alternative.

The reduced acreage of NSO stipulations compared with the BLM No Action Alternative would reduce protections for public health and safety in some areas under this alternative; however, increased ROW exclusion and avoidance areas under this alternative would increase health and safety protections in some areas. Because the number of new wells under this alternative is projected to be slightly higher than the BLM No Action Alternative, the impacts on public health and safety are expected to be approximately the same as the BLM No Action Alternative (see **Table 3-1**, RFD Projections by Alternative).

BIA Alternatives

Impacts Common to All BIA Alternatives

Under all BIA alternatives, risks to public health and safety would increase. This is due to the increased oil and gas development projected to occur in the BIA mineral decision area (see **Table 3-1**, RFD Projections by Alternative). Additionally, under all BIA alternatives, fluid mineral leasing and subsurface development in areas of NSO or CSU stipulations could indirectly affect CIMPPs and diminish the ability of Tribes to conduct ceremonies or otherwise use these cultural resources, which could impact the mental well-being of certain Tribal members as described by Begay (2001).

A stipulation states that the lessee and their employees would not use or permit to be used any part of said leased land for unlawful conduct or purposes whatsoever. This could provide some protection against increased levels of crime by creating the possibility for additional lease-related penalties if crimes do occur on a lease.

BIA No Action Alternative

The current management, which would be continued under the BIA No Action Alternative, does not apply most stipulations relating to public health and safety. Lessees would continue to be responsible for complying with all applicable laws and regulations.

Under this alternative, new wells could not be drilled within 500 feet of any house, structure, or reservoir of water, live stream, or other body of water without the written consent of the Navajo Nation Minerals Department and the Water Code Administration. On individual Indian allotment lands, lessees could not construct any well pad within 200 feet of any structures or improvements.

The BIA No Action Alternative would not apply stipulations regarding lighting and flaring, noise reduction, road maintenance, or residential use of gas from wells.

BIA Alternative A

Under this alternative, stipulations would require that lessees implement measures to control lighting and light resulting from flaring on well sites and off-site facilities to limit light pollution. The lighting measures should consider sensitive wildlife habitat or nest locations, and could include down lighting, flare shielding, and alternate lighting colors. This could incidentally reduce the impacts from light and flaring on nearby

populations compared with the BIA No Action Alternative, which does not have stipulations on lighting or flaring.

A stipulation under this alternative would require that noise levels at nest sites for golden eagles and ferruginous hawks shall be no higher than 48.6 dBA. This alternative could provide some incidental protection from noise impacts on persons living in proximity to golden eagle and ferruginous hawk nest sites.

Under this alternative, lessees could not construct a well pad within 1,320 feet (0.25 miles) of any structure on a home site lease, house, barn, occupied dwelling, building unit, or other community, municipal, and public structures and buildings, such as chapter houses and schools. Compared with the BIA No Action Alternative, requiring that wells be further away from residences would reduce the levels of exposure experienced by residents to harmful air emissions and levels of light and noise pollution, all of which dissipate over greater distance.

Operators would ensure that dirt roads are maintained in accordance with the Clean Water Act and BLM standards, and route roads to share ROWs where feasible. This would reduce the locations at risk of crashes and traffic impacts compared with the BIA No Action Alternative.

Under this alternative, the lessor would no longer be entitled to connect a gas line to new wells for use in gas stoves and lamps in the residence. This would protect public health and safety by reducing the risk of a gas explosion in residences from using unprocessed, odorless gas lacking mercaptan additives for smell.

BIA Alternative B

Under this alternative, stipulations would require that lessees implement measures to control lighting and light resulting from flaring on well sites and off-site facilities to limit light pollution. The lighting measures should emphasize limiting light pollution at views seen from key cultural resources identified by the NPS, Navajo Nation, or other Tribes. This could incidentally reduce the impacts from light and flaring on nearby populations compared with the BIA No Action Alternative, which does not have stipulations on lighting or flaring.

A stipulation under this alternative requires that noise levels at the boundary of the CCNHP and at Chacoan outlier sites shall be no higher than 35 dBA at night. This alternative could provide some incidental protection from noise impacts on persons living in proximity to the CCNHP or Chacoan outlier sites.

Under this alternative, the impacts of imposing a 1,320 feet (0.25 miles) setback from any structure on a home site lease, house, barn, occupied dwelling, building unit, or other community, municipal, and public structures and buildings, such as chapter houses and schools would be the same as those described under BIA Alternative A.

Impacts of maintaining dirt roads and routing roads to share ROWs where feasible would be the same as those described under BIA Alternative A. Prohibiting connection of gas lines to new wells for use in gas stoves and lamps in residences would also have the same impacts as those described under BIA Alternative A.

BIA Alternative C

Under this alternative, stipulations would require that lessees implement measures to control lighting and light resulting from flaring on well sites and off-site facilities to protect the night sky and CIMPPs (including the Navajo concept of Yádiłhił) and limit light pollution. The lighting measures should be considerate of locations significant to residents, such as homes, churches, schools, chapter houses, clinics, sacred sites, or areas of traditional practice. The lighting measures should include down lighting, flare shielding, and alternate lighting colors. Additionally, timing restrictions would require that operators notify the community 1 week in advance of flaring and provide flaring information. This could reduce the impacts from light and flaring on

nearby populations compared with the BIA No Action Alternative, which does not have stipulations on lighting or flaring.

A stipulation under this alternative requires that noise levels at locations significant to residents, such as homes, churches, schools, chapter houses, clinics, sacred sites, CIMPPs, or areas of traditional practice shall be no higher than 35 dBA at night. This alternative could provide protection from noise impacts on persons living in the aforementioned locations.

Under this alternative, the impacts of imposing a 1,320 feet (0.25 miles) setback from any structure on a home site lease, house, barn, occupied dwelling, building unit, or other community, municipal, and public structures and buildings, such as chapter houses and schools would be the same as those described under BIA Alternative A.

Impacts of maintaining dirt roads and routing roads to share ROWs where feasible would be the same as those described under BIA Alternative A. Prohibiting connection of gas lines to new wells for use in gas stoves and lamps in residences would also have the same impacts as those described under BIA Alternative A.

BIA Alternative D

Under this alternative, stipulations would require that lessees implement measures to control lighting and light resulting from flaring on well sites and off-site facilities to limit light pollution. Additionally, operators are required to notify the community 1 week in advance of flaring and provide flaring information. This could incidentally reduce the impacts from light and flaring on nearby populations compared with the BIA No Action Alternative, which does not have stipulations on lighting or flaring.

New wells could not be drilled within 500 feet of any structure on a home site lease, house, barn, occupied dwelling, building unit, or other community, municipal, and public structures and buildings, such as chapter houses and schools. On individual Indian allotment lands, lessees could not construct any well pad within 200 feet of any structures or improvements, or at a distance approved by the allottee, unless the Indian surface owner's written consent was obtained. This would provide approximately the same level of protection from exposure to harmful air emissions and the same levels of light and noise pollution in residences as the BIA No Action Alternative.

Impacts of maintaining dirt roads and routing roads to share ROWs where feasible would be the same as those described under BIA Alternative A. Prohibiting connection of gas lines to new wells for use in gas stoves and lamps in residences would also have the same impacts as those described under BIA Alternative A.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions contributing to cumulative impacts on public health and safety include public health and safety concerns relating to exploration and extraction of fluid minerals on private or state fluid minerals in the planning area. Drilling, stimulation, and production would expose the public to air, noise, and light emissions from generators and drilling equipment; spills of hazardous chemicals; fires and equipment explosions; and heavy equipment travel and traffic. Incremental impacts would include an increased potential for exposure to public health and safety hazards in areas identified as open to development. There would be fewer public health and safety issues for areas that restrict leasing or surface facilities. Vegetation management would continue to expose the public to risk from wildland fire and hazardous chemicals.

Cumulative impacts on public health and safety could increase over time. Under the BLM and BIA No Action Alternatives, closures, stipulations, and setbacks are applied to limit impacts on public health and safety. BLM and BIA Alternative B would prevent the most cumulative impacts on public health and safety in areas closed to fluid mineral leasing. BLM and BIA Alternative C would reduce cumulative impacts on public health and safety in areas with NSO stipulations and reduce cumulative impacts of light pollution with CSU stipulations.

Under all action alternatives, however, preventing or minimizing surface disturbances and requiring adequate road maintenance would be emphasized to prevent or minimize impacts on public health and safety.

3.8 UNAVOIDABLE ADVERSE IMPACTS

Section 102(C) of NEPA requires disclosure of any adverse environmental impacts that cannot be avoided should the proposal be implemented. Unavoidable adverse impacts are those that remain following the implementation of mitigation measures or impacts for which there are no mitigation measures. Some unavoidable adverse impacts occur because of implementing the FMG RMPA/EIS. Others are a result of public use of the planning area lands or other factors outside BLM and BIA control. This section summarizes major unavoidable impacts; discussions of the impacts of each management action (in the discussion of alternatives) provide greater information on specific unavoidable impacts.

Surface-disturbing activities, such as oil and gas development, pipeline and road construction, and other construction activities in the planning area would impact air resources, soil resources, wildlife, water resources, vegetation communities, cultural resources, paleontological resources, visual resources, and others, as detailed in the paragraphs below. This is an unavoidable impact, although the BLM and BIA alternatives would seek to mitigate the impact to the extent feasible. Additionally, well density in the planning area would increase.

Unavoidable adverse impacts on air quality would result from surface-disturbing activities (e.g., construction of well pads and roads, pipelines, and vegetation treatments), OHV use, fire and fuels management, some recreational activities, and operation and maintenance of existing facilities and infrastructure in the planning area. These activities would release fugitive dust, exhaust emissions, and smoke into the atmosphere, thereby adversely affecting air quality. In addition, these activities would release CO₂, CH₄, and other GHGs into the atmosphere.

Surface-disturbing activities, motorized vehicle use and recreation, inappropriate grazing practices, and the operation and maintenance of existing facilities and infrastructure in the planning area would contribute to soil erosion and soil compaction, sediment loading of water bodies, and the potential spread of invasive plants. Invasive plants would continue to spread via the wind, in water courses, and by attaching to livestock, wildlife, humans, and vehicles. The continued presence of invasive plants in the planning area is considered an unavoidable impact.

Surface-disturbing activities and the development of mineral, energy, and other facilities in the planning area are expected to cause the unavoidable degradation, loss, and fragmentation of habitats, and, therefore, would unavoidably affect wildlife that depends on these habitats. Protection of some resource values (e.g., wildlife, listed species, cultural, and paleontological resources) would adversely affect mineral development. Conversely, mineral development would adversely affect the distribution of some wildlife, listed species, and vegetation communities.

Surface-disturbing activities and development for resource uses would change the landscape, scenic quality, and setting in the planning area. Surface-disturbing activities, motorized vehicle use, theft and vandalism, and natural processes (e.g., erosion) would adversely affect cultural and paleontological resources in the planning area. Residents would also be affected by these activities, as would traditional uses and other Native American Tribal interests associated with the planning area.

Although mitigation measures could be implemented for scientific data recovery of cultural or paleontological resources, the impacts on areas of any excavation would not be mitigable. The number of sites anticipated to be inadvertently damaged is unknown but is directly proportional to the acreage disturbed. Natural processes, such as erosion and natural decay or deterioration, could also result in unmitigated damage to cultural or paleontological resources.

In addition, unavoidable adverse impacts would result from implementing proposed restrictions on energy and mineral resource development and other resource uses to protect sensitive resources and other values.

These restrictions would lessen the ability of operators, permittees, individuals, and groups to use public lands and could increase operating costs.

3.9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Section 102(C) of NEPA requires a discussion of any irreversible or irretrievable commitments of resources that are involved in the proposal should it be implemented. An irretrievable commitment of a resource is one in which the resource or its use is lost for a period of time (e.g., extraction of any locatable mineral ore or oil and gas). An irreversible commitment of a resource is one that cannot be reversed (e.g., the extinction of a species or disturbance to protected cultural resources). The air quality resource in the planning area is not irreversible or irretrievable.

Each alternative contains a range of management actions that may lead to future irreversible and irretrievable commitments of those resources, once a decision is made. Decisions made in the selected alternative serve to guide future actions and subsequent site-specific decisions. Following the signing of the RODs for the FMG RMPA/EIS, the BLM would take implementation actions, such as holding lease sales and reviewing and approving APDs. Decisions in these implementation actions require appropriate project-specific planning and NEPA analysis and constitute BLM's final approval authorizing on-the-ground activities to proceed. Similarly, the BIA would issue leases or other authorizations for on-the-ground activities. Assuming subsequent implementation decisions authorize activity- or project-specific plans, irreversible and irretrievable commitment of resources would occur. For most resources, the FMG RMPA/EIS would provide objectives for management and guidance for future implementation-level decisions to minimize the potential for irreversible and irretrievable commitments of resources.

This section identifies the irreversible and irretrievable impacts on resources and resource uses that may occur as a result of implementing one of the five alternatives for each agency. The exact nature and extent of any irreversible and irretrievable commitment of resources cannot be defined due to uncertainties about location, scale, timing, and rate of implementation, and the relationship to other actions and the effectiveness of mitigation measures throughout the life of this plan.

The air quality resource in the planning area is not irreversible or irretrievable; however, committed actions that consume PSD increment would use up available PSD increment for other proposed sources. For this EIS, there are no actions by BLM or BIA that would require PSD permitting.

Implementing the FMG RMPA/EIS management actions would result in surface-disturbing activities, including mineral and energy development and ROW development, which results in a commitment to the loss of irreversible or irretrievable resources. Mineral extraction or sale eliminates a nonrenewable resource, thereby resulting in irreversible and irretrievable commitment of the resource. The associated surface disturbance from energy development is reclaimed after the resource is removed. However, surface disturbances from ROWs for roads are generally a long-term encumbrance of the land.

Construction of roads, well pads, and other transportation infrastructure improvements can also create an irretrievable loss of wildlife habitat.

Use of surface water from watersheds may result in an irretrievable commitment of water that would otherwise have contributed to major river systems, including the Colorado River. Produced water from oil and gas wells in the planning area may be an irretrievable commitment of groundwater, depending on its use, once it reaches the surface. Increases in sediment, salinity, and nonpoint source pollution that result from surface-disturbing activities could result in degradation of water quality and an irretrievable loss of water utility. All of these changes in water quality and quantity have the potential to impact domestic water supplies.

Laws protecting cultural resources would provide for mitigation of irreversible and irretrievable impacts on historic properties and CIMPPs from permitted activity. There is still the potential for irreversible and irretrievable impacts on CIMPPs such as those that could occur when there are impacts on a CIMPP of singular importance to a Tribe or other group. Examples of this type of CIMPP for the Navajo could include

diyin dine'é nídaldahgóó (regions associated with Navajo deities), hajííneí (place of emergence), or even kéyah hane' bidadiit'i'góó (locations important in Navajo traditional history).

3.10 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Section 102(C) of NEPA requires discussion of the relationship between local, short-term uses of the human environment, and the maintenance and enhancement of long-term productivity of resources. As described in the introduction to this report, “short term” is defined as anticipated to occur in 1 to 5 years of the activity’s implementation. “Long term” is defined as following the first 5 years of implementation, to the end of, or beyond, the life of the FMG RMPA/EIS (projected to be 20 years).

Regardless of which alternative is selected, management activities would result in various short-term adverse impacts, such as increased localized soil erosion, localized dust that could affect air quality, or damage to wildlife habitat. Other short-term impacts could improve long-term productivity and provide beneficial impacts.

Short-term impacts, such as vegetation treatments, would beneficially affect long-term productivity for wildlife and rangeland management by increasing available forage or by improving wildlife habitats. Additionally, short-term impacts of vegetation treatments would result in long-term improvements for scenic quality.

Management actions and BMPs could minimize the effect of short-term uses and reverse the change during the long term if applied. However, BLM- and BIA-managed lands are managed to foster multiple uses and protect and improve Native American trust assets, and some long-term productivity impacts might occur regardless of management approach.

Chapter 4. Consultation and Coordination

4.1 INTRODUCTION

The BLM and BIA conduct land use planning in accordance with NEPA requirements, CEQ regulations, and DOI, BLM, and BIA policies and procedures implementing NEPA. NEPA and associated laws, regulations, and policies require the BLM and BIA to seek public involvement early in and throughout the planning process. This is to develop a reasonable range of alternatives to proposed actions and to prepare environmental documents that disclose the potential impacts of proposed actions and alternatives.

The BLM and BIA are involving the public and other stakeholders by way of *Federal Register* notices, public and informal meetings, individual contacts, media releases, planning bulletins, and the project website (<https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage¤tPageId=98894>). This involvement is at the heart of the planning process leading to the FMG RMPA/EIS.

4.2 PUBLIC COLLABORATION AND OUTREACH

Public involvement is a vital and legally required component of both the planning and NEPA processes. The BLM and BIA have worked to ensure effective public participation in the process and have implemented and revised outreach methods in consideration of the unique cultural conditions present in the planning area. This includes, among other methods, having Navajo translators at public meetings to present and translate oral input, translating public newsletters into audio Navajo recordings on CDs, making materials available at Navajo Chapter Houses, and advertising public meetings and project updates on local radio stations in English and Navajo. Public meetings have been held within affected communities. The BLM and BIA will continue to implement these methods to facilitate effective public participation throughout the NEPA process. The project website contains detailed public scoping reports that provide information on public collaboration and outreach that has been accomplished for the project to date.

Consultation with the Navajo Nation Chapters is considered part of public collaboration and outreach, as Chapters are subdivisions of the Navajo Nation, and consultation with the Navajo Nation (as described below in **Section 4.3**) is conducted through the President of the Navajo Nation. In April 2014, the BLM held outreach meetings with the Navajo Nation Chapters of Nageezi, Huerfano, Counselor, and Ojo Encino to provide information to the members on the RMPA and NEPA processes, listen to members' concerns with and questions about the project, and collect comments.

In 2016 and 2017, the BLM participated in additional meetings with representatives from the Nageezi, Ojo Encino, Counselor, and Torreón/Star Lake Chapters of the Navajo Nation; the BIA was also in attendance at many of these meetings.

During 2018 and 2019, the BLM and BIA met with the Navajo Nation Chapters of Becenti, Ojo Encino, Newcomb, and the Tri-Chapters (Counselor, Nageezi, and Lybrook) to update representatives of the Chapters on the progress of the RMPA and NEPA processes.

Future Public Involvement

Public participation will be ongoing throughout the remainder of the FMG RMPA/EIS process. One substantial part of the process is providing an opportunity for the public to comment on the document during the comment period. In the final FMG RMPA/EIS, the BLM and BIA will respond to all substantive comments received during the 90-day comment period on the draft FMG RMPA/EIS. Public meetings will

be held during the 90-day comment period following distribution of the draft EIS. The agencies will issue the ROD after the release of the final FMG RMPA/EIS and any resolution of protests received on it.

4.3 NATIVE AMERICAN TRIBAL CONSULTATION

The BLM and BIA have initiated consultation with Tribes that are identified as having cultural affiliation with, or traditional cultural properties and interests in, the planning area. The BLM has primary responsibility for the FMG RMPA/EIS to conduct the consultation required by the NHPA and other relevant authorities. The identified Tribes are the Hopi Tribe, Jicarilla Apache Tribe, Navajo Nation, Southern Ute Indian Tribe, Ute Mountain Ute Tribe, Pueblo of Acoma, Pueblo of Cochiti, Pueblo of Isleta, Pueblo of Jemez, Kewa Pueblo, Pueblo of Laguna, Pueblo of Nambé, Ohkay Owingeh Pueblo, Picuris Pueblo, Pueblo of Pojoaque, Pueblo of Sandia, Pueblo of San Felipe, Pueblo de San Ildefonso, Pueblo of Santa Ana, Santa Clara Pueblo, Taos Pueblo, Pueblo of Tesuque, Pueblo of Zia, and Zuni Pueblo.

In April 2014, the BLM held outreach meetings with the Navajo Nation in Window Rock to provide information on the plan amendment and NEPA process and to listen to concerns or questions about the project. The BLM also met with the Hopi Tribe in Kykotsmovi, Arizona. During this meeting, the BLM provided information about the RMPA and EIS and recorded the Tribe's concerns and questions for consideration during EIS development.

In 2016 and 2017, the BLM participated in additional meetings with various Tribes, including representatives from the Navajo Nation and the Pueblos of Acoma, Laguna, and Santa Ana; the BIA attended many of the meetings in 2017. In 2018 and 2019, the BLM and BIA met with the Pueblos of San Felipe, Acoma, Laguna, and Zuni, and the Navajo Nation.

In addition to the Tribal consultation described above, the BIA has collaborated with Navajo Nation EPA and Navajo Nation Department of Natural Resources staff to have them provide technical reviews of analysis in the EIS.

Further, the BLM attended meetings of the All Pueblo Council of Governors (APCG) and the Ten Southern Pueblos Council in June and December 2016. APCG is comprised of the 20 governors from the Pueblos of New Mexico and Texas, and the Ten Southern Pueblos Council is comprised of the southern New Mexico Pueblos of Cochiti, San Felipe, Kewa (Santo Domingo), Sandia, Santa Ana, Zia, Jemez, Isleta, Laguna and Acoma.

The BLM and BIA are consulting with Tribes on an ongoing basis throughout the RMPA/EIS process to ensure that the concerns of Tribes are considered.

4.4 COOPERATING AGENCY COORDINATION

On February 26, 2014, the BLM sent written invitations to eligible federal agencies, state and local governments, and federally recognized Native American Tribes to participate as cooperating agencies during the development of the FMG RMPA/EIS. These agencies were invited to participate because they have jurisdiction by law or special expertise. More specifically, cooperating agencies “work with the BLM, sharing knowledge and resources, to achieve desired outcomes for public lands and communities within statutory and regulatory frameworks” (BLM Land Use Planning Handbook H-1601-1 [BLM 2005]). After the BIA became a co-lead agency for the FMG RMPA/EIS, it and the BLM sent new invitations to potential cooperating agencies on April 25, 2017. Twenty-two agencies have agreed to participate in the RMPA/EIS process as designated cooperating agencies, one agency declined, and the remainder have not responded (**Appendix O**, Cooperating Agency Participation).

The BIA and BLM will engage these agencies throughout the planning process, including participation in alternatives development and reviewing and commenting on draft sections of this draft RMPA/draft EIS.

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