United States Department of the Interior
Bureau of Land Management

Environmental Assessment DOI-BLM-NM-F010-2014-____

Huerfano Unit HZDK No. 2H

February 2014

U.S. Department of the Interior
Bureau of Land Management
Farmington District
Farmington Field Office
6251 N. College Blvd., Ste. A
Farmington, NM 87402
Phone: (505) 564-7600
FAX: (505) 564-7608

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.

TABLE OF CONTENTS

1. Purpose and Need for Action 1
   1.1. Background 1
   1.2. Purpose and Need for Action 1
   1.3. Decision to be Made 1
   1.4. Conformance with Applicable Land Use Plan(s) 2
   1.5. Relationship to Statutes, Regulations or Other Plans 2
   1.6. Scoping, Public Involvement, and Issues 6
2. Proposed Action and Alternative(s) 7
   2.1. Proposed Action 7
   2.2. No Action 9
   2.3. Alternatives Considered but Eliminated from Detailed Study 9
3. Affected Environment and Environmental Consequences 10
   3.1. Air Resources 10
   3.2. Cultural Resources 15
   3.3. Upland Vegetation 16
   3.4. Special Management Species 17
   3.5. Migratory Birds 19
   3.6. Wildlife 21
   3.7. Livestock Grazing 23
4. Supporting Information 24
   4.1. Tribes, Individuals, Organizations, or Agencies Consulted 24
   4.2. List of Preparers 24
   4.3. References 24

Appendix A. Application and Authorities 28

Appendix B. Maps 29

This page intentionally left blank.

1. PURPOSE AND NEED FOR ACTION

1.1. Background

A representative of Burlington Resources Oil & Gas Company LP (Burlington) filed an Application for Permit to Drill (APD) with the Bureau of Land Management's Farmington Field Office (BLM/FFO) for the proposed Huerfano Unit HZDK No. 2H mineral resource well. The proposed development is situated north of Huerfano Mountain in gradually sloping to gently rolling sagebrush plain. The proposed well location would contain one horizontal well intended to target natural gas reserves in Dakota Sandstone. The proposed well would develop federal mineral resources administered by the BLM/FFO. The proposed well pad, access road, and subsurface well-tie pipeline are located on State of New Mexico surface managed by the New Mexico State Lands Office in Section 36, Township 26 North, Range 10 West, New Mexico Principle Meridian (NMPM), in San Juan County, New Mexico. New surface disturbance as a result of the proposed action would be 5.194 acres.

This site-specific analysis tiers into and incorporates by reference the information and analysis contained in the Farmington Proposed Resource Management Plan Final Environmental Impact Statement (PRMP/FEIS). This project EA addresses site-specific resources and/or impacts that are not specifically covered within the PRMP/FEIS, as required by the National Environmental Policy Act of 1969 (NEPA), as amended (Public Law 91-90, 42 U.S.C. 4321 et seq.).

1.2. Purpose and Need for Action

The purpose for the proposal is to provide the applicant with reasonable access to their mineral lease. The need for the action is established by the BLM's responsibility under the Mineral Leasing Act to respond to the APD. It is the policy of the BLM to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs. The Mineral Leasing Act of 1920 (MLA), as amended [30 USC 181 et seq.], authorizes the BLM to issue oil and gas leases for the exploration of oil and gas and permit the development of those leases, as well as issue rights-of-way for oil & gas infrastructure. The existing lease is a binding legal contract that allows development of the mineral by the holder.

1.3. Decision to be Made

Based on the information in this environmental assessment (EA), the BLM/FFO will decide whether to approve the APD, and if so, under what terms and conditions. Under the National Environmental Policy Act (NEPA) (Public Law [PL] 91-90, 42 USC 4321 et seq.), the FFO must determine if there are any significant environmental impacts associated with the proposed action, warranting further analysis in an Environmental Impact Statement (EIS). The BLM/FFO Field Manager is the responsible officer who will decide either:

- To approve the APD with design features as submitted;
- To approve the APD with additional mitigations;
- To analyze the effects of the proposal in an EIS; or
- To deny the APD.

An approved APD, issued by the BLM, authorizes the applicant to develop their mineral lease.

1.4. Conformance with Applicable Land Use Plan(s)

Pursuant to 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21, this site-specific environmental assessment (EA) tiers to and incorporates by reference the information and analysis contained in the Farmington Proposed Resource Management Plan/Final Environmental Impact Statement [(PRMP/FEIS) BLM 2003a]. This EA is in conformance with the management goals set forth in the Resource Management Plan (RMP) for the Farmington Field Office (FFO) of the BLM, which was approved by the Record of Decision (ROD) signed September 29, 2003, and updated in December 2003 (BLM 2003b). Specifically, this action is in conformance with the following objective: 1. It is the policy of the BLM to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs, consistent with national objectives of an adequate supply of minerals at reasonable market prices. At the same time, the BLM strives to ensure that mineral development is carried out in a manner that minimizes environmental damage and provides for the rehabilitation of affected lands (2003b, 2-2). The PRMP/FEIS, RMP, and ROD are available for review at the BLM Farmington Field Office, 6251 College Blvd., Ste. A, Farmington, NM, or electronically at:

http://www.nm.blm.gov/ffo/ffo_home.html

This EA addresses the resources and impacts on a site-specific basis as required by the National Environmental Policy Act (NEPA) of 1969, as amended (Public Law 91-90, 42 USC 4321 et seq.). The proposed project would not be in conflict with any local, county, or state plans.

1.5. Relationship to Statutes, Regulations or Other Plans

1.5.1. Clean Water Act

Surface Water Resources

Recognizing the potential for the continued or accelerated degradation of the Nation's waters, the U.S. Congress enacted the Clean Water Act (CWA), formerly known as the Federal Water Pollution Control Act (33 U.S.C. 1344). The objective of the CWA is to maintain and restore the chemical, physical, and biological integrity of the waters of the United States.

Under Section 402 of the CWA (as amended), the U.S. Environmental Protection Agency (EPA), was directed to develop a phased approach to regulate storm water discharges under the National Pollutant Discharge Elimination System (NPDES) program. Industrial activities disturbing land may require permit coverage through a NPDES storm water discharge. Depending on the acreage disturbed, either a Phase I industrial activity (five or more acres disturbance) or a Phase II small construction activity (between one and five acres disturbance) permit may be required. Section 402(l)(2) of the CWA exempts entities that carry out certain oil and gas activities from obtaining storm water permits, including site preparation and associated activities (i.e., construction of access roads, drilling sites, waste management pits, pipelines, etc.). This rule exempts the oil and gas industry, including associated construction activities, from Federal NPDES storm water permits, except in very limited instances. Facilities that have a discharge of a reportable quantity release or that contribute pollutants (other than non-contaminated sediment) to a violation of a water quality standard are required to obtain and maintain NPDES permit coverage for storm water for the entire operating life of the facility.

Section 404 of the CWA authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into the waters of the United States (U.S.), including wetlands. The U.S. Army Corps of Engineers (USACE) has jurisdiction over "waters of the U.S." These jurisdictional waters include those that have a "significant nexus" to traditional navigable waters. The BLM/FFO and USACE Durango Regulatory Office have determined that jurisdictional waters may include U.S. Geological Survey (USGS) watercourses (i.e., "blue lines" on USGS 1:24,000 topographic maps).

After conducting onsite inspection of the proposed development, referencing the USGS Huerfano Trading Post, NM 7.5-minute topographic quadrangle, and utilizing the USFWS online National Wetland Inventory (NWI), the proposed development would not impact a USGS watercourse.

Ground Water Resources

Stimulation (i.e., hydraulic fracturing or "fracking") is a process used to maximize the extraction of underground resources by allowing oil or natural gas to move more freely from the rock pores to production wells that bring the oil or gas to the surface. Fluids, commonly made up of water (99 percent) and chemical additives (1 percent), are pumped into a geologic formation at high pressure during hydraulic fracturing (USEPA 2004). Chemicals added to stimulation fluids may include friction reducers, surfactants, gelling agents, scale inhibitors, acids, corrosion inhibitors, antibacterial agents, and clay stabilizers. When the fracking pressure exceeds the rock strength, the fluids open or enlarge fractures that typically extend several hundred feet away from the well bore, and may occasionally extend up to 1,000 feet from the well bore. After the fractures are created, a propping agent (usually sand) is pumped into the fractures to keep them from closing when the pumping pressure is released. After fracturing is completed, a portion of the injected fracturing fluids returns to the wellbore and is recovered for future fracturing operations (USEPA 2004) or disposal. Stimulation techniques have been used in the United States since 1949 and in the San Juan Basin since the 1950s. Over the last 10 years, advances in multi-stage and multi-zone hydraulic fracturing have allowed development of gas fields that previously were uneconomic, including the San Juan Basin.

Hydraulic fracturing is a common process in the San Juan Basin and applied to nearly all wells drilled. The producing zone targeted by the proposed well (Dakota Sandstone) is well below any underground sources of drinking water. Dakota Sandstone is overlain by the Mancos Shale Formation, which itself is overlain by a continuous confining layer. The geological confining layer is the Lewis Shale Formation that is located above both the Mancos Shale and Mesaverde Group Formations and provides an impermeable layer that isolates the Mancos Shale and Mesaverde Group Formations from both identified sources of drinking water and surface water. Fracturing could possibly extend into the Mancos Shale Formation overlying Dakota Sandstone; however, the Mancos Shale Formation has not been identified as an underground source of drinking water based on its depth and relative high levels of TDS. No impacts to surface water or freshwater-bearing groundwater aquifers are expected to occur from hydraulic fracturing of the proposed well.

1.5.2. Endangered Species Act

The Endangered Species Act (ESA) of 1973 requires all federal departments and agencies to conserve threatened, endangered, and critical and sensitive species and the habitats on which they depend, and to consult with the U.S. Fish and Wildlife Service (USFWS) on all actions authorized, funded, or carried out by the agency to ensure that the action will not likely jeopardize the continued existence of any threatened and endangered species or adversely modify critical habitat. Consultation with the USFWS, as required by Section 7 of the ESA, was conducted as part of the Farmington PRMP/FEIS (Consultation No. 2-22-01-I-389) to address cumulative effects of RMP implementation. The consultation is summarized in Appendix M of the PRMP/FEIS. Farmington Field Office staff reviewed the action alternatives and determined they would be in compliance with threatened and endangered species management guidelines outlined in the September 2002 Biological Assessment (Consultation No. 2-22-01-I-389). Water used to construct, produce, and maintain the proposed well would be acquired from the Huerfano Unit Water Well #2 (POD# SJ 00194); no unaccounted-for water depletions within USFWS-listed fish habitat would occur. Therefore, there is no need for additional Section 7 consultation.

1.5.3. National Historic Preservation Act

Compliance with Section 106 responsibilities of the National Historic Preservation Act are adhered to by following the BLM – New Mexico SHPO protocol agreement, which is authorized by the *National*

Programmatic Agreement between the BLM, the *Advisory Council on Historic Preservation*, and the *National Conference of State Historic Preservation Officers*, and other applicable BLM handbooks.

1.5.4. Paleontological Resources

Fossils found on BLM-managed lands are considered part of our national heritage and afforded protection. The BLM manages fossil resources for their scientific, educational, and recreational values. On public lands paleontological resources are managed under authorities and policy's that govern the management and preservation of the resource. Paleontological resources are managed under numerous authorities including the BLM Field Office 2003 Resource Management Plan (2003b:4-117), Paleontological Resources Preservation Act of 2009 (Sections 6301-6312 of the Omnibus Public Lands Act of 2009, 16 USC 470aaa), Federal Land Policy and Management Act of 1976 (P.L. 94-579), National Environmental Policy Act of 1969 (P.O. 91-190), Potential Fossil Yield Classification System for Paleontological Resources on Public Lands (IM 2008-009), and the Assessment and Mitigation of Potential Impacts to Paleontological Resources (IM 2009-011). The authorities provide for civil and criminal penalties and also require that public lands be managed to preserve and protect the quality of scientific values of paleontological resources.

The BLM's Potential Fossil Yield Classification (PFYC, BLM 2008-009) system is a predictive modeling tool that was developed to provide baseline guidance for assessing and mitigating paleontological resources. It is intended to be utilized at an intermediate point in analyses, and should be used to assist in determining the need for further mitigation assessment or actions (IM 2008-011). The PFYC is based on the fact that occurrences of paleontological resources are often closely tied to the geologic units that contain them. This classification does not reflect rare or isolated occurrences of significant fossils or individual localities, only the relative occurrence on a formation- or member-wide basis. Although it is recognized that local differences have to be taken into account. Using the PFYC system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts.

The BLM FFO recognized eight Paleontological Special Designated Areas (SDA) in the current Resource Management Plan (more than 135,000 acres) in order to preserve important paleontological resources for scientific study, protection, and other public benefits (BLM 2003b:4-117). The BLM has determined that these areas require special management attention in order to protect, and prevent irreparable damage to important paleontological resources.

The need for additional mitigation to protect paleontological resources will be determined on a case-by-case basis. The Paleontology Resource Staff, in collaboration with the Authorized Officer, will analyze the Survey Report for survey findings and determine any mitigation recommendations. If no further mitigation is needed, the Authorized Officer should promptly notify the project proponent that there will be no additional paleontological surveys or mitigation required, and the project may proceed, pending any other approvals.

1.5.5. Wastes, Hazardous or Solid

The Resource Conservation and Recovery Act (RCRA) passed in 1976, establishes a comprehensive program for managing hazardous wastes from the time they are produced until their disposal. The U.S. Environmental Protection Agency (EPA) regulations define solid wastes as any "discarded materials" subject to a number of exclusions. A "hazardous waste" is a solid waste that is (1) is listed by the EPA as a hazardous waste, (2) exhibits any of the characteristics of hazardous wastes (ignitability, corrosivity, reactivity, or toxicity) or (3) is a mixture of solid and hazardous waste.

A 1980, amendment to RCRA conditionally exempted from regulation as hazardous wastes, "drilling fluids, production waters, and other wastes associated with the exploration, development, or production of

crude oil or natural gas. On July 6, 1988, EPA determined that oil and gas exploration, development and production (ED&P) wastes would not be regulated as hazardous wastes under RCRA. A simple rule of thumb was developed for determining if an ED&P waste is likely to be considered exempt or non-exempt from RCRA regulations: If (1) the waste came from down-hole, or (2) the waste was generated by contact with the oil and gas production stream during removal of produced water or other contaminants, the waste is most likely to be considered exempt by EPA.

The Comprehensive Environmental Response Compensation and Liability Act (CERCLA), passed in 1980, deals with the release (spillage, leaking, dumping, accumulation, etc.) or threat of a release of hazardous substances into the environment. Despite many oil and gas constituent wastes being exempt from hazardous waste regulations, certain RCRA exempt contaminants could be subject to regulations as hazardous substances under CERCLA. The New Mexico the Oil Conservation Division (OCD) administers hazardous waste regulations for oil and gas activities in New Mexico.

Typical wastes associated with the proposed development would include trash, sewage, produced water, and produced hydrocarbons. During drilling and completion, a trash receptacle and a chemically treated portable toilet would be on location for trash and sewer disposal. All produced hydrocarbons would be put in tanks on location during completion work. Produced water would be put in onsite tanks (closed-loop system) or within lined reserve pits during completion work. All wastes would be disposed of in a proper manner as required by federal and state law, and as described in the COAs. No known hazardous or solid waste materials are present within the analysis area. The notification of releases such as natural gas, natural gas liquids, and petroleum, outside a facility site is required under CERCLA and under BLM NTL-3A.

1.5.6. Public Health and Safety

All worker safety is governed by Occupational Safety and Health Administration (OSHA) safety laws and regulations. Worker safety incidents must also be reported to the BLM under the procedures of Notice to Lessee (NTL)-3A. Pipeline safety regulations are administered by OSHA as well as Department of Transportation (DOT) regulations. Pipeline safety regulations (49 CFR Parts 190 and 192) govern design, construction and operation of gas transmission lines. Any incidents involving DOT-regulated pipelines must be reported under these regulations (District 2003a).

Most substances and wastes generated at oil and gas facilities are exempt from regulation under the Resource Conservation and Recovery Act (1976). The Environmental Protection Agency (EPA) and DOT regulate materials associated with well construction and production activities that are classified as hazardous. When significant amounts of chemicals are stored on-site, governmental agencies will be notified as required under the Emergency Planning and Community Right to Know Act (1986). The notification of releases such as natural gas, natural gas liquids, and petroleum, outside the facility site is required under the Comprehensive Environmental Response Compensation and Liability Act, 1980 (CERCLA) and under BLM NTL-3A. A well location must have an informational sign, as directed under 43 CFR 3160.

Additional hazards to the general public in the proposed action area include safety hazards associated with increased traffic during construction, drilling, and reclamation activities. General hazards around producing oil and gas fields such as accidental pipeline failures and moving equipment like pump jacks are potential/present in the action area. Hydrogen sulfide gas is not known to be or expected to be a problem within the project area.

1.6. Scoping, Public Involvement, and Issues

The Farmington Field Office (FFO) publishes a NEPA log for public inspection. This log contains a list of proposed and approved actions in the field office. The log is located on the BLM New Mexico website (http://www.blm.gov/nm/st/en/prog/planning/nepa_logs.html). No public comments were received for this proposed action.

The proposed project was circulated among FFO resource specialists. Internal scoping through a BLM Interdisciplinary Team (IDT) generated resource issues pertinent to the proposed project. Issues include:

- What would be the effect of the alternatives on air resources/air quality?
- What would be the effect of the alternatives on cultural resources?
- What would be the effect of the alternatives on upland vegetation in the analysis area?
- What would be the effect of the alternatives on FFO Special Management Species?
- What would be the effect of the alternatives on migratory birds?
- What would be the effect of the alternatives on wildlife resources?
- What would be the effect of the alternatives on livestock grazing resources?

2. PROPOSED ACTION AND ALTERNATIVE(S)

2.1. Proposed Action

Burlington proposes to construct a well pad on State of New Mexico surface in order to horizontally drill and develop federal mineral resources in Dakota Sandstone. Burlington would construct a BLM resource road to gain access to the proposed well site off of San Juan County Road 7425. Once the well is drilled and proves to be viable, a subsurface well-tie pipeline would be constructed to transport produced natural gas to existing Huerfano Unit No. 145 pipeline infrastructure operated by Enterprise Field Services, LLC (Enterprise). The proposed development is situated north of Huerfano Mountain in gradually sloping to gently rolling sagebrush plain. Total new surface disturbance as a result of the proposed project would be approximately 5.194 acres on State of New Mexico surface managed by the New Mexico State Lands Office.

Table 1. Proposed Huerfano Unit HZDK No. 2H Well Information

Surface Location								
UL or Lot No.	**Section**	**Township**	**Range**	**Feet from the**	**North/South Line**	**Feet from the**	**East/West Line**	**County**
P	36	26 N	10 W	686	SOUTH	621	EAST	SAN JUAN
Bottom Hole Location If Different From Surface								
UL or Lot No.	**Section**	**Township**	**Range**	**Feet from the**	**North/South Line**	**Feet from the**	**East/West Line**	**County**
P	31	26 N	9 W	475	SOUTH	65	EAST	SAN JUAN

The proposed well pad is 330-feet by 300-feet with a 50-foot construction buffer zone around the perimeter of the pad, for a total permitted area of approximately 3.95 acres. The well pad would require a maximum cut of 5 feet at the southwest corner five, and a maximum fill of 8 feet at the northeast corner two. The construction buffer zone may be used to stockpile topsoil or vegetative material that would be utilized later during reclamation. Production pits, if used, would be lined and would meet NMOCD pit guidelines and requirements, NMAC 19.15.17. Cut and fill slopes would be returned to the original contour upon reclamation. Potential surface water run-off would be diverted around and away from the well pad area. Drainages and diversions would be established upon reclamation following construction and drilling activities.

Burlington would construct and maintain a BLM resource road to access the well location. The proposed resource road would be 47.29 feet in length with an average clearing width of 30 feet. The final travel surface will be 14 feet wide. Long-term surface disturbance as a result of access road construction would be approximately 0.033 acre.

Once the well has been completed and proves viable, a 2,746.07-foot subsurface well-tie pipeline would be constructed to transport produced natural gas to existing Huerfano Unit No. 145 pipeline infrastructure operated by Enterprise. The proposed well-tie pipeline would be constructed parallel to proposed and existing roads for 2,711.80 feet and on the proposed well pad for 34.27 feet. Total new surface disturbance as a result of well-tie pipeline construction would be approximately 1.245 acres. Installation of the well-tie pipeline would consist of digging a trench with excavation equipment such as a wheel-ditcher or backhoe, laying pipe, and back filling the trench. The pipeline would be buried at least 3 feet deep, except at road crossings where it would be buried at least 4 feet.

Production equipment used during the life of the well may include a separator - dehydrator, a meter run, a pumping unit, and 400-barrel tanks and/or smaller fiberglass or galvanized tanks for water disposal. It is also likely that a compressor would be placed on location during the life of the well. The use of compressors provides an increase in the economic life of the well, increases the ultimate recovery of gas from low-pressure reservoirs, and prevents waste of the resources.

Table 2. Proposed New Surface Disturbance

Facility		Disturbance	
		Feet	Acres
Huerfano Unit HZDK No. 2H	Well Pad	330 x 300	2.273
	Construction Buffer Zone	1,460 x 50	1.676
	Access Road	47.29 x 30	0.033*
	Well-tie Pipeline	2,711.80 x 20	1.245
		Total	**5.194**
* Proposed access road will be constructed entirely within well pad construction buffer zone			

Farmington Field Office established environmental Best Management Practices (BMPs) will be followed during construction and reclamation of the well site pad, pipeline tie, access road, facility placement, or any other surface disturbing activity associated with this project. Bureau-wide standard BMPs are found in the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, Fourth Edition-Revised 2007 (The Gold Book). Farmington Field Office BMPs are integrated into the general and site-specific stipulations.

For a detailed description of design features and construction practices associated with the proposed action, refer to the APD (attached as Appendix A). Also see the subject APD package for additional maps showing the proposed well location and associated facilities described above. Implementation of committed mitigation measures contained in the Conditions of Approval (COAs) are also listed in Appendix A and incorporated and analyzed in this alternative.

Prior to the development of this document, onsite inspections of the proposed project area were conducted by representatives of Adkins Consulting, Inc., Burlington, the BLM, Enterprise, La Plata Archaeological Consultants (LAC), and United Field Services. Design features that were agreed upon during onsite inspections and surveys include the following:

- All construction and/or maintenance resulting in surface disturbance would be done in accordance to the BLM Surface Operating Standards and Guidelines for Oil and Gas Development, Fourth Edition-Revised 2007 (The Gold Book). Construction design practices could include culverts, diversion ditches, berms, and other such soil erosion control structures. Additional hydrological BMPs would be installed where needed to maintain drainages within the proposed action area. Excavated materials from the cuts on the proposed well location would be used on the fill portions. Reclaimed slopes would be re-contoured to pre-construction topographical contours.
- If used, all pits would meet State of New Mexico, Oil Conservation Division (NMOCD) pit guidelines and requirements, NMAC 19.15.17.
- The proposed BLM resource road would be developed in accordance with the BLM Gold Book Standards and BLM 9113-1 (Roads Design Handbook) and BLM 9113-2 (Roads Inventory and Condition Assessment Guidance and Instructions Handbook).
- Water used to construct, produce, and maintain the proposed well would be acquired from the Huerfano Unit Water Well #2 (POD# SJ 00194) located in SE Section 25, T-26-N, R-10-W.
- The dominant vegetation composition within the analysis area is Sagebrush Community. The following seed mixture was chosen during onsite inspection for use in reclamation activities: fourwing saltbush, winterfat, Indian ricegrass, blue grama, galleta, bottlebrush squirreltail, small burnet, and Rocky Mountain bee plant. Revegetation of the affected environment will reduce or minimize impacts created by water and/or wind erosion to exposed surfaces. The well location will be reduced to an approved working area and the entire well-tie pipeline construction disturbance will be reclaimed. The remaining surface disturbance would remain disturbed for the life of the well for production equipment and vehicle travel surfaces. Following final down-hole plugging and abandonment of the well, the entire well location and access road would be reclaimed.

- All BLM/FFO cultural resources stipulations will be followed as indicated in the Cultural Resource Records of Review. These stipulations may include, but are not limited to, temporary or permanent fencing or other physical barriers, monitoring of earth disturbing construction, project area reduction and/or specific construction avoidance zones, and employee education. All employees, contractors, and sub-contractors of the project will be informed by the project proponent that cultural sites are to be avoided by all personnel, personal vehicles, and company equipment, and that it is illegal to collect, damage, or disturb cultural resources, and that such activities are punishable by criminal and or administrative penalties under the provisions of the Archaeological Resources Protection Act (16 U.S.C. 470aa-mm). In the event of a discovery during construction, the project proponent will immediately stop all construction activities in the immediate vicinity of the discovery and immediately notify the archaeological monitor, if present, or the BLM. The BLM would then evaluate or cause the site to be evaluated. Should a discovery be evaluated as significant (e.g., National Register, NAGPRA, ARPA), it will be protected in place until mitigating measures can be developed and implemented according to guidelines set by the BLM.
- Design features and BMPs are designed to minimize effects on migratory birds. These measures may include netting of any permanently open pits and vent caps on all open pipes to prevent bird entry and nesting. All construction activities would be confined to permitted areas only. Rapid and permanent vegetation and cover reestablishment would minimize impacts to migratory birds. All hazards associated with construction and operation of the proposed action would be fenced or contained in storage tanks.
- During operation, any open pits would be netted and vent caps placed on all open pipes to prevent wildlife entry. Any spills would be promptly cleaned up and an emergency response plan prepared. All chemicals or fluids stored on-site would be properly contained and would have secondary containment.

2.2. No Action

The BLM NEPA Handbook (H-1790-1) states that for Environmental Assessments (EAs) on externally initiated proposed actions, the No Action Alternative generally means that the proposed activity will not take place. This option is provided in 43 CFR 3162.3-1 (h) (2). This alternative would deny the approval of the proposed application, and the current land and resource uses would continue to occur in the proposed project area. No mitigation measures would be required.

2.3. Alternatives Considered but Eliminated from Detailed Study

No alternatives have been developed that would result in significantly fewer impacts to the resources in the analysis area. If an alternative well site were required, impacts to the resources would be similar to those of the proposed action.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the environment that would be affected by implementation of the alternatives described in Chapter 2. Aspects of the affected environment described in this chapter focus on the relevant major resources or issues. Certain critical environmental components require analysis under BLM policy. These items are included above in Section 1.6.

Under the No Action Alternative, the proposed action would not be approved and carried forward. There would be no new impacts from oil and gas exploration or production to the resources in the analysis area. The No Action Alternative would result in the continuation of the current land and resource uses in the analysis area and is used as the baseline for comparison of alternatives.

3.1. Air Resources

3.1.1. Affected Environment

The proposed well is located in San Juan County, New Mexico. Additional general information on air quality in the area is contained in Chapter 3 of the Farmington PRMP/FEIS. In addition, new information about greenhouse gases (GHGs), and their effects on national and global climate conditions has emerged since this document was prepared. On-going scientific research has identified the potential impacts of GHG emissions such as carbon dioxide (CO_2) methane (CH_4); nitrous oxide (N_2O); water vapor; and several trace gases on global climate. Through complex interactions on a global scale, GHG emissions may cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and burning of fossil carbon sources have caused GHG concentrations to increase measurably, and may contribute to overall climatic changes, typically referred to as global warming.

Much of the information referenced in this section is incorporated from the Air Resources Technical Report for BLM Oil and Gas Development in New Mexico, Kansas, Oklahoma, and Texas (herein referred to as Air Quality Technical Report; USDI/BLM 2013b). This document summarizes the technical information related to air resources and climate change associated with oil and gas development and the methodology and assumptions used for analysis.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including six nationally regulated ambient air pollutants (criteria pollutants). These criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM10 & PM2.5), sulfur dioxide (SO_2) and lead (Pb). EPA has established National Ambient Air Quality Standards (NAAQS) for criteria air pollutants. The NAAQS are protective of human health and the environment. EPA has approved New Mexico's State Implementation Plan and the state enforces state and federal air quality regulations on all public and private lands within the state, except for tribal lands and within Bernalillo County. Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology and terrain, and also includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. EPA has proposed or completed actions recently to implement Clean Air Act requirements for greenhouse gas emissions. Climate has the potential to influence renewable and non-renewable resource management.

Air Quality

Criteria Air Pollutants

The Air Quality Technical Report describes the types of data used for description of the existing conditions of criteria pollutants, how the criteria pollutants are related to the activities involved in oil and gas development, and provides a table of current national and state standards (USDI/BLM 2013b). The EPA Green Book web page reports that all counties in the analysis area, San Juan, McKinley, Rio Arriba, and Sandoval Counties in New Mexico and La Plata County, Colorado, are in attainment of all National Ambient Air Quality Standards (NAAQS) as defined by the Clean Air Act. The area also does not violate any New Mexico Ambient Air Quality Standards (NMAAQS). The current criteria pollutant "design concentrations" in the analysis area are described below. Design Concentrations are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. Table 3 shows monitored design values for ozone in recent years for each of the three San Juan County ozone monitoring stations.

Table 3. Reported Ozone Values for San Juan County Ozone Monitoring Stations

State Air Monitoring Station	8-hour Ozone Design Value (ppm[1])				NAAQS[2]
	2007-2009	2008-2010	2009-2011	2010-2012	2008
Substation	0.067	0.063	0.063	0.067	0.075
Bloomfield	0.061	0.060	0.061	0.067	0.075
Navajo Lake	0.069	0.066	0.068	0.071	0.075

Source: United State Environmental Protection Agency Air Quality System Preliminary Design Value Report, Mar. 22, 2013
(1) parts per million
(2) NAAQS – National Ambient Air Quality Standards

Table 4 summarizes monitored design values for other criteria pollutants in San Juan County.

Table 4. Criteria Pollutant Design Value Concentrations monitored in San Juan County

Pollutant	Design Value	Averaging Time	NAAQS	NMAAQS
NO_2	13 ppb	Annual	53 ppb	50 ppb
NO_2	39 ppb	1-hour	100 ppb[1]	0.10 ppm (24-hour)
PM_{10}	Data incomplete	24-hour	150 µg/m[3,4]	150 µg/m[3,4]
$PM_{2.5}$	4.5µg/m^3	Annual	12 µg/m[3,5]	60 µg/m[3,4]
$PM_{2.5}$	14µg/m^3	24-hour	35 µg/m[1,3]	
SO_2	0.001ppm	Annual	None	0.02 ppm
SO_2	20ppb	1-hour	75 ppb[6]	None
SO_2	0.008 ppm	24-hour	None	0.10ppm

Source: EPA, 2012
[1] 98th percentile, averaged over 3 years
[2] Not to be exceeded more than once per year on average over 3 years
[3] The NMAAQS is a standard for total suspended particulate matter
[4] Annual mean, averaged over 3 years
[5] 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years

In 2005, the EPA estimated that there was less than 0.01 ton per square mile of lead emitted in the analysis area, which is less than 2 tons total (USDI/BLM 2011b). There is no monitoring conducted for lead and CO in northwestern New Mexico; however, concentrations of these pollutants are expected to be low in rural areas and are therefore not monitored.

Hazardous Air Pollutants

The Air Quality Technical Report discusses the relevance of hazardous air pollutants (HAPs) to oil and gas development and the particular HAPs that are regulated in relation to these activities (USDI/BLM 2013b). EPA has identified 187 toxic air pollutants as HAPs. In March 2011, the EPA published the fourth in a series of National Scale Air Toxics Assessments (NATA) that quantifies HAP emissions for 2005 by U.S. counties. The purpose of the NATA is to identify areas where HAP emissions result in high health risk. Computer models are used to develop estimates of risk of cancer or other health impacts. NATA presents risk hazard indexes for cancer, neurological, and respiratory problems for each county and census tract. Because techniques have changed over the years, each NATA is not comparable to those previously issued. EPA also cautions that because data availability varies from state to state, the results are not necessarily comparable from one geographic area to another. The 2005 NATA analysis estimated tract level total cancer risk for the analysis area as 25 to 50 per one million, and the estimated tract level total respiratory hazard index was zero to 1. The EPA estimates the average national cancer risk for 2005 was 50 per one million, meaning 1 person out of every 20,000 had an increased likelihood of contracting cancer from breathing air toxics from outdoor sources if exposed to 2005 emission levels over their lifetime. A respiratory hazard index below 1 indicates that exposures in the area do not exceed reference levels that would have adverse effects for human health.

Climate

The analysis area is located in a semiarid climate regime typified by dry windy conditions and limited rainfall. Summer maximum temperatures are generally in the range of 80 or 90 degrees Fahrenheit (°F), and winter minimum temperatures are generally in the teens to 20s. Temperatures occasionally reach above 100°F in June and July and have dipped below zero in December and January. Precipitation is divided between summer thunderstorms associated with the southwest monsoon and winter snowfall as Pacific weather systems drop south into New Mexico. Table 5 shows climate normals for the 30-year period from 1981 to 2010 for the Farmington, New Mexico, area.

Table 5. Climate Normals for the Farmington Area, 1981-2010

Month	Average Temperature (^{O}F)	Average Maximum Temperature (^{O}F)	Average Minimum Temperature (^{O}F)	Average Precipitation (inches)
January	30.5	40.8	20.3	0.53
February	35.8	46.8	24.8	0.59
March	43.2	56.1	30.3	0.78
April	50.4	64.7	36.2	0.65
May	60.4	74.8	46.1	0.54
June	69.8	85.1	54.5	0.21
July	75.4	89.6	61.2	0.90
August	73.2	86.5	59.8	1.26
September	65.4	79.1	51.7	1.04
October	53.3	66.4	40.1	0.91
November	40.5	52.2	28.8	0.68
December	31.0	41.2	20.7	0.50
Source: USDI/BLM 2013b; data collected at New Mexico State Agricultural Science Center - Farmington				

3.1.2. Impacts from the Proposed Action

Methodology and assumptions for calculating air pollutant and greenhouse gas emissions are described in the Air Resources Technical Report (USDI/BLM 2013b). This document incorporates the sections discussing the modification of calculators developed by the BLM to address emissions for one horizontal gas well. The calculators give an approximation of criteria pollutant, HAP, and greenhouse gas (GHG)

emissions to be compared to regional and national emissions levels (USDI/BLM 2013b). Also incorporated into this document are the sections describing the assumptions used in developing the inputs for the calculator (USDI/BLM 2013b).

Direct and Indirect Impacts

Criteria Pollutants

Table 6 shows estimated emissions from one proposed horizontal gas well for criteria pollutants, volatile organic compounds (VOC) and greenhouse gas (GHG). For comparison, Table 7 shows total human-caused emissions for each of the counties in the FFO and La Plata County, Colorado, based on USEPA's 2008 emissions inventory (USEPA 2011).

Table 6. Criteria Pollutant and VOC Emissions Estimated for Construction of One Horizontal Gas Well; Average 25 Days to Drill and Complete

Activity	NOx	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH4	CO2
One time operations (tons)*								
Construction	5.5	1.5	0.5	2.5	0.25	0.1	0.007	598.85
Completion	0.5	0.1	0.03	0.025	0.025	-	-	55.00
Interim Reclamation	0.006	0.006	0.006	0.001	-	0.003	-	1.24
Final Reclamation	0.006	0.006	0.006	0.001	-	0.004	-	1.66
Ancillary Operations (tons)								
Workover	0.129	0.04	0.01	0.01	0.01	-	-	10.59
Road Maintenance	-	-	-	-	-	-	-	0.26
Road Traffic	-	-	-	-	-	-	-	0.06
Annual operations (tons/yr)								
Equipment Leaks	-	-	-	-	-	-	0.013	-
Field Compression	0.14	0.29	0.10	0.01	0.01	-	-	19.30
Total	**6.28**	**1.94**	**0.65**	**2.55**	**0.30**	**0.11**	**0.02**	**686.96**

Table 7. Analysis Area Emissions in Tons/Year, 2008

County	NO_X[(1)]	CO[(2)]	VOC[(3)]	PM_{10}[(4)]	$PM_{2.5}$[(5)]	SO_2[(6)]
McKinley	12,595.0	31,885.2	37,509.0	66,590.7	6,977.5	1,659.8
Rio Arriba	4,276.6	27,352.9	45,841.5	46,321.6	4,746.2	89.1
San Juan	35,651.7	54,549.5	46,994.9	69,655.7	8,108.3	11,471.0
Sandoval	4,780.1	33,290.5	31,733.6	36,232.3	4,056.3	123.4
Total	**57,303.4**	**147,078.1**	**160,079**	**218,800.3**	**23,897.3**	**13,343.3**

Source: EPA 2008 National Emissions Inventory (http://www.epa.gov/ttn/chief/net/2008inventory.html)
(1) NO_X – nitrogen oxides
(2) CO – carbon monoxide
(3) VOC – volatile organic compounds
(4) PM_{10} – particulate matter with an aerodynamic diameter equal to or less than 10 microns
(5) $PM_{2.5}$ – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
(6) SO_2 – sulfur dioxide

Table 8 displays the percent increase in total emissions in the analysis area from the proposed action to construct and operate one horizontal gas well.

Table 8. Percent Increase in Analysis Area Emissions from the Proposed Action

	NO_X[1]	CO[2]	VOC[3]	PM_{10}[4,5]	$PM_{2.5}$[5,6]	SO_2[5,7]
Total Emissions	57,303.4	147,078.1	160,079.0	218,800.3	23,897.3	13,343.3
Conventional Gas Well Emissions	6.28	1.94	0.65	2.55	0.30	0.13
Percent Increase	**0.01**	**0.001**	**0.0004**	**0.001**	**0.001**	**0.001**

(1) NO_X – nitrogen oxides
(2) CO – carbon monoxide
(3) VOC – volatile organic compounds
(4) PM_{10} – particulate matter with an aerodynamic diameter equal to or less than 10 microns
(5) Values derived from average emissions for any well drilling in the analysis area. Calculated results available upon request.
(6) $PM_{2.5}$ – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
(7) SO_2 – sulfur dioxide

Hazardous Air Pollutants

The formulas used for calculating HAPs in the calculators are very imprecise. For many processes it is assumed that emission of HAPs will be equivalent to 10 percent of VOC emissions. Therefore, the estimated HAP emissions 0.065 tons/year should be considered a very gross estimate.

Total Greenhouse Gases

The available statewide GHG summary (NMED 2010) combines GHG emissions from CO_2 and CH_4. To compare the GHG emissions from the Proposed Action estimated by the calculator with statewide GHG emissions, CO_2e emissions for both CH_4 and CO_2 were summed. The total statewide GHG emission estimate for 2007 was 76,200,000 metric tons CO_2e (76.2 million metric tons; NMED 2010). The estimated CO_2e metric tons emissions from one conventional gas well (623.2 metric tons) would represent a 0.0008 percent increase in New Mexico CO_2 emissions.

Cumulative Impacts

The FFO manages Federal hydrocarbon resources in San Juan, Sandoval, Rio Arriba, and McKinley Counties. There are approximately 23,522 wells in the San Juan Basin. About 16,435 of the wells in these counties are Federal wells. Analysis of cumulative impacts for reasonable development scenarios and RFDS of oil and gas wells on public lands in the FFO was presented in the 2003 RMP. This included modeling of impacts on air quality. A more detailed discussion of Cumulative Effects can be found in the Air Resources Technical Report (USDI/BLM 2013b).

The primary activities that contribute to levels of air pollutant and GHG emissions in the Four Corners area are electricity generation stations, fossil fuel industries, and vehicle travel. The Air Quality Technical Report includes a description of the varied sources of national and regional emissions that are incorporated here to represent the past, present, and reasonably foreseeable impacts to air resources (USDI/BLM 2013b). It includes a summary of emissions on the national and regional scale by industry source. Sources that are considered to have notable contributions to air quality impacts and GHG emissions include electrical generating units, fossil fuel production (nationally and regionally), and transportation.

The emissions calculator estimated that there could be very small direct and indirect increases in several criteria pollutants, HAPs, and GHGs as a result of implementing the proposed alternative. The very small increase in emissions that could result would not be expected to result in exceeding the NAAQS for any criteria pollutants in the analysis area.

The very small increase in GHG emissions that could result from implementing the proposed alternative would not produce climate change impacts that differ from the No Action Alternative. This is because

climate change is a global process that is impacted by the sum total of GHGs in the Earth's atmosphere. The incremental contribution to global GHGs from the action alternatives cannot be translated into effects on climate change globally or in the area of this site-specific action. It is currently not feasible to predict with certainty the net impacts from the action alternatives on global or regional climate.

The Air Resources Technical Report (USDI/BLM 2013b) discusses the relationship of past, present, and future predicted emissions to climate change and the limitations in predicting local and regional impacts related to emissions. It is currently not feasible to know with certainty the net impacts from particular emissions associated with activities on public lands.

3.2. Cultural Resources

3.2.1. Affected Environment

The proposed project is located within the archaeologically rich San Juan Basin of northwest New Mexico. In general, the history of the San Juan Basin can be divided into five major periods: PaleoIndian (ca. 10000 B.C. to 5500 B.C.), Archaic (ca. 5500 B.C. to A.D. 400), Basketmaker II-III and Pueblo I-IV periods (aka Anasazi; A.D. 1-1540), and the historic (A.D. 1540 to present), which includes Native American as well as later Hispanic and Euro-American settlers. Detailed descriptions of these various periods are provided in the Bureau of Land Management Farmington Field Office Final Environmental Impact Statement (2003) and will not be reiterated here. Additional information can also be found in an associated documented, Cultural Resources Technical Report (CRTR; SAIC 2002).

Cultural sites vary considerably, and can include but are not limited to simple artifact scatters, domiciles of various types with a myriad of associated features, rock art and inscriptions, ceremonial/religious features, and roads and trails. Traditional Cultural Properties (TCPs; Parker and King 1998) are a separate class of cultural resources and are places that have cultural values that transcend, for instance, the values of scientific importance that are normally ascribed to cultural resources such as archaeological sites, and may or may not coincide with archaeological sites.

For the Proposed Action, identification of TCPs were limited to reviewing existing published and unpublished literature (e.g. Van Valkenburgh 1941, 1974; Brugge 1993; Kelly et al 2006), and the site-specific Class III survey report prepared for the Proposed Action. In addition, the BLM's cultural resources program was contacted for information regarding the presence of TCPs identified through ongoing BLM tribal consultation efforts.

The entire Area of Potential Effect (APE) for the Proposed Action was archaeologically surveyed by La Plata Archaeological Consultants (LAC) at a BLM Class III level (100%) and reports were prepared and submitted to the BLM in accordance with the Procedures for Performing Cultural Resources Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities (BLM 2005).

The Class III inventory identified no cultural sites within the APE (LAC Report 2013-3s; BLM Report ****). No TCPs are known to exist in the APE.

3.2.2. Impacts from the Proposed Action

Direct and Indirect Impacts

There are no cultural sites within the APE. The proposed action is not known to physically threaten any TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere or otherwise hinder the performance of traditional ceremonies/rituals. The Proposed Action will have no direct or indirect impacts on cultural sites.

Cumulative Impacts

There will be no negative cumulative impact on cultural resources as no cultural sites are present. A positive cumulative effect is the additional scientific information yielded by the archaeological survey.

3.3. Upland Vegetation

3.3.1. Affected Environment

The analysis area is located within the United States Environmental Protection Agency (USEPA) designated Arizona/New Mexico Plateau Level III Ecoregion. The Arizona/New Mexico Plateau occurs primarily in Arizona, Colorado, and New Mexico, with a small portion in Nevada. This ecoregion is approximately 45,870,500 acres (185,632 km^2), and the elevation ranges from 2,165 to 11,949 feet (660 to 3,642 meters). The ecoregion's landscapes include low mountains, hills, mesas, foothills, irregular plains, alkaline basins, some sand dunes, and wetlands. This ecoregion is a large transitional region between the semiarid grasslands to the east, the drier shrublands and woodlands to the north, and the lower, hotter, less vegetated areas to the west and south. Vegetation communities include shrublands with big sagebrush, rabbitbrush, winterfat, shadscale saltbush, and greasewood; and grasslands of blue grama, western wheatgrass, green needlegrass, and needle-and-thread grass. Higher elevations may support piñon pine and juniper forests. The ecoregion includes the urban areas of Santa Fe and Albuquerque. Important land uses include irrigated farming, recreation, rangeland, wildlife habitat, and some natural gas production.

The analysis area contains primarily big sagebrush (*Seriphidium tridentatum*) with a minor ground cover of blue grama (*Bouteloua gracilis*), Indian ricegrass (*Achnatherum hymenoides*), broom snakeweed (*Gutierrezia sarothrae*), and New Mexican prickly pear cactus (*Opuntia phaeacantha*). Rabbitbrush (*Chrysothamnus* sp.) was documented along roadsides and scattered within various intermittent/ephemeral drainages. Wolfberry (*Lycium pallidum*), fishhook cactus (*Sclerocactus cloveriae* ssp.), and aster (*Aster* sp.) were also documented within the analysis area.

3.3.2. Impacts from the Proposed Action

Direct and Indirect Impacts

Potential impacts on Sagebrush Community habitat from the development of the proposed project would include direct impacts from habitat removal as well as a wide variety of indirect impacts. Impacts would be incurred during initial site preparation and would continue throughout the operational life of the project, typically extending over a period of several decades. Plant communities and habitats affected by direct or indirect impacts from project activities could incur short- or long-term changes in species composition, abundance, and distribution. Some impacts may also continue after the decommissioning of the project. Land areas available for project development support a wide variety of plant communities and habitats.

In some areas, restoration may potentially include species that are not locally native or plant communities different from local native communities. Although the replanting of disturbed soils may successfully establish vegetation in some locations (i.e., with a biomass and species richness similar to those of local native communities), the resulting plant community may be quite different from native communities in terms of species composition and representation of particular vegetation types, such as shrubs. The community composition of replanted areas would likely be greatly influenced by the species that are initially seeded, and colonization by species from nearby native communities may be slow. In addition, the planting of non-native species may result in the introduction of those species into nearby natural areas. The establishment of mature native plant communities may require decades, and some community types may never fully recover from disturbance. Successful reestablishment of some habitat types, such as some shrubland communities, may be difficult and may require considerably greater periods of time. Restoration of plant communities in areas with arid climates (e.g., averaging less than 9 inches (20 cm) of annual precipitation) would be especially difficult (Monsen et al. 2004).

Indirect impacts on upland habitats on or off the project site could result from land clearing and exposed soil; soil compaction; and changes in topography, surface drainage, and infiltration characteristics. Indirect impacts could include the degradation of habitat from construction activities occurring in adjacent areas.

In addition to habitat removal, the operation of heavy equipment within the project area may result in injury or destruction of existing vegetation and biological (microbiological) soil crusts, and the compaction and disturbance of soils (Belnap and Herrick 2006). Soil aeration, infiltration rates, and moisture content could be impacted. Biological soil crusts occur in deserts and other sparsely vegetated arid habitats and are important for soil stability, nutrient cycling, and water infiltration; their disturbance may affect the development of plant communities (Fleischner 1994; Belnap et al. 2001; Gelbard and Belnap 2003). All these factors could affect the rate or success of vegetation reestablishment.

Cumulative Impacts

Within the FFO planning area there are approximately 435,500 acres of Great Basin Desert Scrub habitat type (USDI/BLM 2003a, page 3-31). Based on the acres of plant community types within the planning area and the estimated total disturbance of future activities, approximately 2.7 percent of the various communities represented would be disturbed within the planning area over 20 years from reasonably foreseeable future actions (USDI/BLM 2003a, page 3-31 and 4-7). The proposed action would reduce approximately 5.2 acres to bare mineral soils. Areas within the permitted project area not needed for production equipment or vehicle travel surface would be re-seeded with an approved seed mixture developed for Sagebrush Community. Changes in vegetation composition and the potential for invasive, non-native species to establish would also cumulatively impact vegetation in the project area.

3.4. Special Management Species

3.4.1. Affected Environment

In accordance with BLM Manual 6840, the Farmington Field Office of the Bureau of Land Management (FFO) has prepared a list of special management species to focus species management efforts toward maintaining habitats under a multiple use mandate, called FFO Special Management Species (SMS). The BLM manages certain sensitive species not federally listed as threatened or endangered in order to prevent or reduce the need to list them as threatened or endangered in the future. The authority for this policy and guidance is established by the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and Department of Interior Manual 235.1.1A. FFO SMS are listed below in Table 9.

The analysis area is located just outside of the FFO-designated potential habitat area for Aztec gilia (*Aliciella formosa*) and Brack's hardwall cactus (*Sclerocactus cloveriae* var. *brackii*). The proposed action area contains primarily big sagebrush interspersed native grasses and forbs. One *Sclerocactus* specimen was documented within the proposed well pad construction buffer zone. Marginal habitat was documented throughout the analysis area.

The proposed action area provides potential foraging habitat for golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalis*), prairie falcon (*Falco mexicanus*), and American peregrine falcon (*Falco peregrinus anatum*). No suitable raptor nesting habitat was documented within the proposed action area. The analysis area is situated within one mile north of Huerfano Mountain, which contains suitable raptor nesting habitat. The analysis area was visually scanned for raptors, raptor nests, and whitewash. No raptors or their sign were observed during the on-site field survey. According to the most recent BLM/FFO raptor nest geographic information system (GIS) data, no historically documented nest sites are located within 1/3 mile of the action area.

No prairie dog burrows or towns were documented within the analysis area to support potential burrowing owl (*Athene cunicularia*) breeding habitat. No significant grassland characteristics were documented

within the proposed action area to support potential mountain plover (*Charadrius montanus*) breeding habitat. No significant surface water resources or suitable wintering habitat was documented within or in the vicinity of the proposed action area to support bald eagle (*Haliaeetus leucocephalus*). No large cottonwood galleries in significant riparian areas were documented within or in the vicinity of the proposed action area to support yellow-billed cuckoo (*Coccyzus americanus*).

Table 9 provides an evaluation of the potential for Special Management Species to occur in the analysis area. None of these species were observed during the field survey of the analysis area, and their potential presence determination is based on evaluation of the proposed action area habitat and the known habitat requirements of the listed species.

Table 9. Special Management Species with Potential to Occur in the Analysis Area

Species Name	Conservation Status		Habitat Associations	Potential to Occur in Analysis Area
	FFO	State of New Mexico		
BIRDS				
Golden Eagle (*Aquila chrysaetos*)	SMS		In the West, mostly open habitats in mountainous, canyon terrain. Nests primarily on cliffs and trees.	The action area contains suitable foraging habitat.
Ferruginous hawk *(Buteo regalis)*	SMS		Grasslands and semi-desert shrub; occasionally piñon-juniper edge habitat. Nest on rock spires in NW New Mexico.	The action area contains suitable foraging habitat.
Prairie falcon *(Falco mexicanus)*	SMS		Arid, open country, grasslands or desert scrub, rangeland; nests on cliff ledges, trees, power structures.	The action area contains suitable foraging habitat.
Mountain plover *(Charadrius montanus)*	SMS		Semi desert, grasslands, open arid areas, bare fields, breeds in open plains or prairie.	The action area does not contain flat, open grasslands for suitable breeding habitat.
Yellow-billed cuckoo *(Coccyzus americanus*)	SMS		Low to mid-elevation riparian woodlands, deciduous woodlands, and abandoned farms and orchards. Rare in the San Juan River valley.	Proposed action area does not contain large cottonwood galleries in significant riparian habitat.
American peregrine falcon (*Falco peregrinus anatum*)	SMS	NM-T	Open country near lakes or rivers with rocky cliffs and canyons. Tall city bridges and buildings also inhabited.	The action area contains suitable foraging habitat.
Bald eagle (*Haliaeetus leucocephalus)*	SMS	NM-T	Near lakes, rivers and cottonwood galleries. Nests near surface water in large trees. May forage terrestrially in winter	The action area does not contain suitable wintering habitat for species to occur.
Burrowing owl *(Athene cunicularia)*	SMS		Associated with prairie dog towns. In dry, open, short-grass, treeless plains	Proposed action area does not contain suitable habitat for foraging or nesting. No associated prairie dog burrows were documented in the action area.
PLANTS				
Brack's hardwall cactus (*Sclerocactus cloveriae*	SMS	NM-E	Sandy clay slopes of the Nacimiento Formation in sparse	Surface soils do not reflect those typical of

ssp. *brackii*)			semi desert, piñon-juniper grasslands and open arid areas of badland habitat (5,000-6,400 ft).	other type localities; analysis area located slightly above typical elevation range. One *Sclerocactus* specimen was documented within the project area.
Aztec gilia (*Aliciella formosa*)	SMS	NM-E	Arid and sparsely vegetated Badland/Salt desert scrub communities in soils of the Nacimiento Formation (5,000-6,400 ft).	Surface soils do not reflect those typical of other type localities; analysis area located slightly above typical elevation range.

3.4.2. Impacts from the Proposed Action

Direct and Indirect Impacts

The analysis area contains suitable habitat for Brack's hardwall cactus to occur. One *Sclerocactus* specimen was documented during onsite inspection and biological survey of the analysis area. The quality of habitat for Brack's cactus was determined to be marginal in that surface soils do not reflect those typical of other type localities. There would be an initial loss of approximately 5.2 acres of potential SMS raptor foraging habitat prior to rehabilitation and reseeding of the affected environment. The analysis area does not contain suitable nesting habitat for SMS raptor species, and is not within a 1/3 mile buffer zone to any historically documented raptor nest site.

Cumulative Impacts

The FFO would continue to manage non-federally listed species according to BLM policies and guidelines, with the goal of contributing to the conservation of these species to reduce the potential for being listed under the ESA of 1973, as amended (USDI/BLM 2003a, 4-111). For reasonably foreseeable actions on federal lands, direct impacts to special status flora and fauna would be avoided through the BLM's siting criteria. Development on federal and private land would result in the removal or modification of potential habitat. These effects would be related to availability of undisturbed habitat in the area and the amount of disturbance that would occur within the area. The PRMP/FEIS determined that cumulatively up to 5.5 percent (128,000 acres) of vegetation in the planning area could be impacted by oil and gas development (USDI/BLM 2003a, page 4-125). Other reasonably foreseeable actions within the planning area that could impact special status species would include livestock grazing, agriculture, commercial and residential development, mining, wildfire, and vegetation management. The proposed action would contribute to long-term habitat loss for BLM special management species within the planning area.

3.5. Migratory Birds

3.5.1. Affected Environment

Executive Order 13186 dated January 17, 2001 calls for increased efforts to more fully implement the Migratory Bird treaty Act of 1918. In keeping with this mandate, the BLM/FFO has issued an interim policy to minimize unintentional take as defined by the EO 13186 and to better optimize migratory bird efforts related to BLM/FFO activities (BLM 2010). In keeping with this policy, a list of priority birds of conservation concern which occur in similar eco-regions as the proposed action area was compiled through a review of existing bird conservation plans including:

- Fish and Wildlife Service (USFWS) Birds of Conservation Concern (BCC)

- New Mexico Partners in Flight (NMPIF) New Mexico Bird Conservation Plan
- Comprehensive Wildlife Conservation Strategy for New Mexico (CWCS)
- Gray Vireo Recovery Plan
- The North American Waterbird Conservation Plan
- Recovery plans and conservation plans/strategies prepared for federally-listed candidate species.

The selected species have a known distribution in the FFO area and may be affected by various types of perturbations. These species and a brief assessment of their habitat are identified in **Error! Reference source not found.**Table 10.

Table 10. Migratory Birds with Potential to Occur in the Project Area

Species Name	Habitat Associations	Potential to Occur in the Project Area
Bendire's thrasher (*Toxostoma bendirei*)	On the Colorado Plateau, inhabits open sagebrush with scattered junipers; sparse or degraded understory, lower elevations. Avoids riparian areas and arroyos with dense shrub cover	Suitable habitat is present within the action area for species to occur.
Black-throated sparrow (*Amphispiza bilineata*)	Xeric habitats dominated by open shrubs with areas of bare ground.	Suitable habitat is present within the action area for species to occur.
Brewer's sparrow (*Spizella breweri*)	Closely associated with sagebrush, preferring dense stands broken up with grassy areas.	Suitable habitat is present within the action area for species to occur.
Gray vireo (*Vireo vicinior*)	In northern NM, open stands of piñon pine and Utah juniper (5,800 – 7,200 ft) with a shrub component and mostly bare ground; antelope bitterbrush, mountain mahogany, Utah serviceberry and big sagebrush often present. Broad, flat or gently sloped canyons, in areas with rock outcroppings, or near ridge-tops.	Lack of significant stands of piñon pine and Utah juniper within the action area likely a limiting factor for species to occur.
Loggerhead shrike (*Lanius ludovicianus*)	Open country interspersed with improved pastures, grasslands, and hayfields. Nests in sagebrush areas, desert scrub, and woodland edges.	Marginal habitat is present within the action area for species to occur. Lack of improved pastures, grasslands, and hayfields likely limiting factors.
Mountain bluebird (*Sialia currucoides*)	Open piñon-juniper woodlands, mountain meadows, and sagebrush shrublands; requires larger trees and snags for cavity nesting.	Marginal habitat is present within the action area for species to occur. Lack of woodland and montane habitat likely limiting factors.
Mourning dove (*Zenaida macroura*)	Open country, scattered trees, and woodland edges. Feeds on ground in grasslands and agricultural fields. Roost in woodlands in the winter. Nests in trees or on ground.	Marginal habitat for species to occur. Lack of trees and grassland characteristics limiting factors.
Sage sparrow (*Amphispiza belli*)	Large and contiguous areas of tall and dense sagebrush. Negatively associated with seral mosaics and patchy shrublands and abundance of greasewood.	Suitable habitat is present within the action area for species to occur.
Sage thrasher (*Oreoscoptes montanus*)	Shrub-steppe dominated by big sagebrush.	Suitable habitat is present within the action area for species to occur.
Scaled quail (*Callipepla squamata*)	Brushy arroyos, cactus flats, sagebrush or mesquite plains, desert grasslands, Plains grasslands, and agricultural areas. Good breeding habitat has a diverse grass composition, with varied forbs and scattered shrubs.	Suitable habitat is present within the action area for species to occur. Lack of diverse grass composition with varied forbs likely a limiting factor.
Swainson's hawk (*Buteo swainsoni*)	A mixture of grassland, cropland, and shrub vegetation; nests on utility poles and in isolated	Marginal habitat is present within the action area for species to occur.

	trees in rangeland. Nest densities higher in agricultural areas.	Proximity to active agricultural areas (NAPI) and utility poles possible attractants to action area for foraging.
Vesper sparrow (*Pooecetes gramineus*)	Dry montane meadows, grasslands, prairie, and sagebrush steppe with grass component; nests on ground at base of grass clumps.	Marginal habitat present within the action area for species to occur. Lack of significant grassland/prairie component a limiting factor.

3.5.2. Impacts from the Proposed Action

Direct and Indirect Impacts

The proposed action would impact approximately 5.2 acres of potential migratory bird habitat in the form of Great Basin Desert scrub dominated by big sagebrush. Adult migratory birds would not be directly harmed by the proposed action because of their mobility and ability to avoid areas of human activity. No active nests within the action area are expected to be directly impacted if project activities occur outside of the typical breeding season of May 15 to July 31. The increased human presence during construction, drilling, and reclamation activities may indirectly disturb or displace adults from nests and foraging habitats for a short period of time. Following the interim reclamation of the affected environment, long term production operations would result in only a slight increase in human activity in the immediate area. Effects to the population status of migratory birds are not anticipated due to the mobility of individuals and the abundance of adjacent habitat for these species. In consideration of these factors, there would be moderate short-term effects to migratory birds, and low long-term effects as a result of the action.

Cumulative Impacts

Cumulative impacts to migratory birds would result from the long-term loss of potential habitat in sagebrush scrub. Habitat fragmentation from new well site construction would also be introduced to the area. Although these impacts may affect individuals, given the level of habitat loss and fragmentation, no population level effects are anticipated from the proposed action.

3.6. Wildlife

3.6.1. Affected Environment

The analysis area is located in a Great Basin Desert scrub community dominated by big sagebrush. Wildlife common to these habitats include Rocky Mountain elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), fox (*Vulpes* sp.), black-tailed jackrabbit (*Lepus californicus*), cottontail rabbit (*Sylvilagus* sp.), and various reptiles (snakes and lizards) and birds. Wildlife or signs observed in the analysis area included common raven, cottontail rabbit, and coyote.

3.6.2. Impacts from the Proposed Action

Direct and Indirect Impacts

Two parameters are considered when evaluating habitat loss - direct habitat loss and indirect or effective habitat loss. Direct habitat loss occurs through the removal of vegetation, which reduces the extent or quality of habitat in terms of food and cover. Vegetation removal strips the affected area of its value to wildlife; therefore, direct habitat loss can be quantified by comparing the area of habitat lost to the amount retained. The amount of habitat available to wildlife is called effective habitat. The effectiveness of habitat is lost when a species reduces use or avoids an area. Loss of effective habitat area can exceed direct habitat loss. Effective habitat loss can occur from habitat fragmentation, disturbance, and interference with movement. The impacts of habitat fragmentation are related to the loss of large contiguous areas of habitat and the relative increase in habitat “edge” in smaller areas. Construction of roads and other development, as well as human and vehicular traffic on existing roads, can cause habitat fragmentation. Such disturbance can cause animals to shift their activity or alter their behavior.

The proposed action would result in the removal and modification of approximately 5.2 acres of vegetation. Vegetation communities within the proposed project area provide forage and cover for big game and other wildlife species. Since the vegetation removed would not be replaced with the same species and because the removal of vegetation in this previously undisturbed area would result in habitat fragmentation, an alteration of available wildlife habitat and utilization is anticipated. Impacts to wildlife habitat would include short-term loss of natural vegetation and long-term changes in composition of vegetation. The majority of direct habitat loss would be short term as areas reclaimed would recover their value as wildlife habitat. However, there would be a long-term loss for well operation and access.

Mule deer and elk have been shown to avoid natural gas wells, roads, and areas immediately surrounding them, resulting in a loss of effective habitat. Hebblewhite summarized that the average zone of influence reported in eight different studies extended about 1,000 meters (3,281 feet) from roads and well locations. The nature and extent of this avoidance is dependent upon the type of vegetation, particularly the amount of cover present, topography, the volume of traffic, and whether or not the vehicles stop or continue moving, however, responses varied within seasons and between species (2011). Disturbance is a primary factor in effective habitat loss as it can alter the ways wildlife use or move through an area and could push individual animals from preferred habitat into less suitable habitat. Such displacement would likely be localized around the source of the disturbance (i.e., equipment noise, human presence, etc.). Data collected by the BLM and New Mexico Department of Game and Fish in the Rosa Wildlife SDA between 1994 and 2012 indicate a positive correlation between increasing number of gas wells and accompanying roads and the decline in mule deer fawn to doe ratios.

Since there is so much variability between studies, and no studies specific to the FFO have been completed, a conservative buffer of 400 meters (1,312 feet) was selected to quantify the potential effective habitat loss resulting from a proposed action. Based on a 400-meter buffer of the proposed development, indirect wildlife habitat loss would affect approximately 124 acres. Avoidance by wildlife would depend on the species, time of day, time of year, human activity level, topography, and cover type. It should also be noted that the zone of influence around roads and well pads does not imply 100 percent avoidance (Hebblewhite 2011). Impacts from effective habitat loss would be greatest during construction and drilling and would decrease over time in correlation to human and vehicular activity levels.

During construction, drilling, and completion, there would be short-term impacts to area wildlife because of human and vehicular activity and associated noise. Wildlife in the area would be displaced to adjacent habitat or may temporarily avoid the project area during construction activities. Once the project is complete, wildlife would likely return to the area. It is possible that small wildlife, particularly burrowing species, may be killed during construction, drilling, and completion. During operation, the level of human and vehicular activity in the analysis area would decrease substantially. However, one light-duty vehicle would continue to access the area on near daily basis. Heavy-duty vehicles (semi-trucks) would access the well sites 1 to 2 times a day for approximately 6 months after which traffic trips would decrease to approximately 1 trip per month. Long-term impacts from vehicle traffic on roads could include incidental mortality to wildlife. Animal-vehicle collisions are variable depending on the time of day, speed and volume of traffic, local topography, structural features of the road, and the size and behavior of the individual species. Wildlife could come into contact with chemicals or fluids stored on site.

Cumulative Impacts

Reasonably foreseeable development within the Blanco sub-watershed may include an estimated additional 677 oil and gas wells and related facilities, and 55 miles of new roads. Surface-disturbing activities that would be associated with these actions may affect an estimated 2,514 acres of wildlife habitat (USDI/BLM 2003a, page 4-7 and 4-8). Other reasonably foreseeable actions such as continued livestock grazing, vegetation treatments, and community development would cumulatively impact wildlife through direct and effective habitat loss. The proposed action would cumulatively contribute direct long-term wildlife habitat loss for well site working area and access road. Indirect habitat loss could affect up to 124 acres including and surrounding the proposed action. The intensity of indirect effects would be dependent upon the species, its life history, time of year and/or day and the type and level of human and vehicular activity occurring. The proposed action would cumulatively contribute approximately 5.2 acres of direct and 124 acres of indirect long-term wildlife habitat loss.

3.7. Livestock Grazing

3.7.1. Affected Environment

The proposed development is located in the Angel Peak grazing Allotment No. 5072. Vegetation within the analysis area has been determined to be Sagebrush Community. The Angel Peak Allotment is 55,045 acres in size and contains 4,911 AUMs. An AUM is the amount of forage needed to sustain a cow (1,000 lb.) or cow/calf pair for one month. The average rangeland carrying capacity for the Angel Peak Allotment is approximately 11.2 acres/AUM. The term grazing authorization permits the utilization of 4,095 active AUMs of forage on 51,199 acres of public lands.

3.7.2. Impacts from the Proposed Action

Direct and Indirect Impacts

The Huerfano Unit HZDK No. 2H well site, access road, and pipeline are proposed to be constructed on the Angel Peak Allotment No. 5072. The associated disturbance for construction of the well site, access road, and pipeline will be approximately 5.2 acres. The estimated short-term impact to range carrying capacity would be a loss of approximately 0.464 AUM (5.2 acres/11.2 acres/AUM). After successful reclamation of the pipeline and well site construction area, the long term-loss of AUMs would be approximately 0.067 AUM (0.75 acre/11.2 acres/AUM).

Additional short term impacts may include displacement of permitted livestock during construction activities or exposure of livestock to hazards. After construction, livestock should become acclimated to the well and traffic associated with its maintenance. Vehicle traffic associated with this well could pose impacts to livestock considering that the area is open range and livestock may be found on roads in the area.

Direct impacts to livestock occur when holes or ditches are not excluded properly. Any type of hole or ditch is potentially a hazard to livestock while grazing. Cow or calf injuries may occur when they fall into a ditch-type cavity or in process of trying to get out. Cow or calf leg injuries also may occur when any type of small hole is left uncovered. Livestock can step into the hole and break a leg.

Impacts to livestock may occur when containment of livestock is compromised (i.e., fencing cutting). This could result in injury to livestock or individuals in the event of a vehicular accident. Indirect impacts include extra time required by the permittee to locate livestock or potential trespass issues for the respective livestock owner if the livestock cross allotment boundaries.

4. SUPPORTING INFORMATION

4.1. Tribes, Individuals, Organizations, or Agencies Consulted

Steven Fuller – La Plata Archaeological Consultants

Lori Gregory, Wildlife Biologist – Adkins Consulting, Inc.

Fred Harden – La Plata Archaeological Consultants

Brent Hottell, Lead Projects – ConocoPhillips Company, San Juan Business Unit

Sam Jaquez, Consultant – Burlington Resources

Marshall Lindeen, Professional Surveyor – United Field Services Inc.

4.2. List of Preparers

Jim Copeland, Archaeologist – Bureau of Land Management, Farmington Field Office

Mike Flaniken, Environmental Protection Specialist – Bureau of Land Management, Farmington Field Office

John Hansen, Wildlife Biologist – Bureau of Land Management, Farmington Field Office

John Kendall, Wildlife Management Biologist - Bureau of Land Management, Farmington Field Office

Amanda Nisula, Planning & Environmental Specialist - Bureau of Land Management, Farmington Field Office

Jeff Tafoya, Rangeland Management Specialist – Bureau of Land Management, Farmington Field Office

Barney Wegener, Natural Resource Specialist – Bureau of Land Management, Farmington Field Office

Matthew Zabka, Environmental Specialist – Adkins Consulting, Inc.

4.3. References

Belnap, J., et al., 2001, Biological Soil Crusts: Ecology and Management, Technical Reference 1730-2, prepared for the U.S. Department of the Interior, Bureau of Land Management, National Science and Technology Center, Denver, Colo.

Brugge, David M. 1993. *An Investigation of AIRFA Concerns Relating to the Fruitland Coal Gas Development Area*. Office of Contract Archaeology, University of New Mexico. Ms. on file, Bureau of Land Management, Farmington, New Mexico.

Climate Change SIR. 2010. *Climate Change Supplementary Information Report for Montana, North Dakota, and South Dakota, Bureau of Land Management*. Report on Greenhouse Gas Emissions and Climate Change for Montana, North Dakota, and South Dakota. Technical report prepared for the Montana/Dakotas Bureau of Land Management by URS Corporation. URS Project 22241790.

Enquist, Carolyn and Gori, Dave. 2008. *Implications of Recent Climate Change on Conservation Priorities in New Mexico*. April 2008.

EPA Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2007. Environmental Protection Agency, Washington, D.C. April 2009.

Fleischner, T.L., 1994, “Ecological Costs of Livestock Grazing in Western North America,” Conservation Biology 8(3):629–644.

Fuller, Steven and Fred Harden. 2014. *A Cultural Resources Survey of Burlington Resources’ Huerfano HZDK Number 2H Well Pad and Access Road and Enterprise Field Services’ Well Tie Pipeline, San Juan County, New Mexico.* LAC Report 2013-3s. La Plata Archaeological Consultants, Dolores, Colorado.

Gelbard, J.L., and J. Belnap, 2003, “Roads as Conduits for Exotic Plant Invasions in a Semiarid Landscape,” Conservation Biology 17(2):420–432.

Goddard Institute for Space Studies. 2007. *Annual Mean Temperature Change for Three Latitude Bands*. Datasets and Images. GISS Surface Temperature Analysis, Analysis Graphs and Plots. New York, New York. (Available on the Internet: http://data.giss.nasa.gov/gistemp/graphs/Fig.B.lrg.gif)

Hebblewhite, M. 2011. Effect of Energy Development on Ungulates *in* Energy Development, editor David E. Naugle. Island Press, Washington, DC, USA.

Intergovernmental Panel on Climate Change (IPCC). 2007. *Climate Change 2007: The Physical Basis (Summary for Policymakers)*. Cambridge University Press. Cambridge, England and New York, New York. (Available on the Internet: http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf)

Intergovernmental Panel on Climate Change (IPCC). *Climate Change 2007, Synthesis Report*. A Report of the Intergovernmental Panel on Climate Change.

Kelly, Klara, Rena Martin, Richard Begay, Ted Neff, and Clifford Werito. 2006. *“We Will Help You With What We Know”: Diné Traditional Cultural Places In Dinétah*. Museum of Northern Arizona Environmental Solutions, Inc., Flagstaff. Ms. on file, Bureau of Land Management, Farmington, New Mexico.

Monsen, S.B., et al., compilers, 2004, Restoring Western Ranges and Wildlands, Rocky Mountain Research Station, U.S. Forest Service, General Technical Report RMRS-GTR-136, Fort Collins, Colo., Sept.

National Academy of Sciences. 2006. *Understanding and Responding to Climate Change: Highlights of National Academies Reports*. Division on Earth and Life Studies. National Academy of Sciences. Washington, D.C. (Available on the Internet: http://dels.nas.edu/basc/Climate-HIGH.pdf)

National Cooperative Soil Survey. 1987. *Soil Survey of Rio Arriba Area, New Mexico, Parts of Rio Arriba and Sandoval Counties.* Natural Resources Conservation Service, United States Department of the Interior, and the New Mexico Agricultural Experiment Station.

New Mexico Environment Department (NMED). 2010. *Inventory of New Mexico Greenhouse Gas Emissions: 2000-2007*. http://www.nmenv.state.nm.us/cc/index.html.

NMED. 2012. *Northwest New Mexico Monitoring Network Presentation to BLM*. June 26, 2012. Presented by Mark Jones New Mexico Environment Department.

New Mexico Natural Heritage Program. 2005. Available at: http://nmnhp.unm.edu.

New Mexico Rare Plant Technical Council. 1999. *New Mexico Rare Plants*. Albuquerque, NM: New Mexico Rare Plants Home Page. (Available at: http://nmrareplants.unm.edu Latest update: 18 January 2006).

Science Applications International Corporation. 2002. *Cultural Resources Technical Report: Background Information on Cultural Resources for the Farmington Draft RMP/EIS*. Ms. on file, Bureau

of Land Management, Farmington, New Mexico.

Simpson, Erik. 2013. *The Cultural Resources Inventory of Thompson Engineering and Production Corporation's Proposed PGA Unit 2 No. 4 Well Pad, Access Road and Well Tie Pipeline, San Juan County, New Mexico.* Report No. 13DCA-015. San Juan County Museum Association, Division of Conservation Archaeology, Bloomfield, New Mexico.

U.S. Department of the Interior (USDI) and U.S. Department of Agriculture (USDA). 2007. *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development*. BLM/WO/ST-06/021+3071/REV 07. Bureau of Land Management. Denver, Colorado.

USDA, Natural Resources Conservation Service (NRCS). 2006. Web Soil Survey. Version 1.1. NRCS. http://websoilsurvey.nrcs.usda.gov/app.

USDI, Bureau of Land Management (BLM). 2003a. *Farmington Proposed Resource Management Plan and Final Environmental Impact Statement*. Farmington, New Mexico.

USDI/BLM. 2003b. *Farmington Resource Management Plan with Record of Decision*. Farmington, New Mexico.

USDI/BLM and USDA Forest Service, San Juan Public Lands Center (SJPLC). 2006. *Final Environmental Impact Statement, Northern San Juan Basin Coal Bed Methane Project*. Durango, Colorado.

USDI/BLM, Farmington Field Office. 2005. *Farmington Field Office Special Status Species Management Policy*. Instruction Memorandum No. IM-NM200-2005-02.

USDI/BLM, Farmington Field Office. 2010. *Migratory Bird Treaty Act - BLM/FFO Interim Management Policy*. Instruction Memorandum No. NM-F00-2010-001.

USDI/BLM. 2011b. Air Resources Technical Report for Oil and Gas Development. New Mexico, Oklahoma, Texas, and Kansas. Bureau of Land Management, New Mexico State office. Santa Fe, New Mexico.

USDI/BLM. 2013b. Air Resources Technical Report for Oil and Gas Development. New Mexico, Oklahoma, Texas, and Kansas. Bureau of Land Management, New Mexico State office. Santa Fe, New Mexico.

U.S. Environmental Protection Agency (USEPA). 2004. Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reserves. Office of Ground Water and Drinking Water (4606M). EPA 816-R-04-003.

USEPA. 2008. National Emissions Inventory. http://www.epa.gov/ttn/chief/net/2008inventory.html

USEPA. 2011. 2005 National-Scale Air Toxics Assessment. Summary of Results. http://www.epa.gov/ttn/atw/nata2005.

USEPA. 2012. Air Trends: Design Values. http://www/epa.gov/airtrends/values.html.

Valkenburgh, Richard F. Van. 1941. *Diné Bikeyah*. Department of the Interior, Office of Indian Affairs, Navajo Services, Window Rock. Ms. on file, Bureau of Land Management, Farmington, New Mexico.

Van Valkenburgh, Richard F. 1974. *Navajo Sacred Places*. Edited by Clyde Kluckhohn. Garland Publishing. New York.

Watkins, B.E., C. J. Bishop, E.J. Bergman, A. Bronson, B. Hale, B.F. Wakeling, L.H. Carpenter, and D.W. Lutz. 2007. *Habitat Guidelines for Mule Deer: Colorado Plateau Shrubland and Forest Ecoregion*. Mule Deer Working Group, Working Association of Fish and Wildlife Agencies.

APPENDIX A. APPLICATION AND AUTHORITIES

A.1. APD with COAs

The APD and COAs contain additional information about the proposed action including maps of all facilities, roads, pipelines, power lines, etc.

A.2. Authorities

Code of Federal Regulations (CFR)

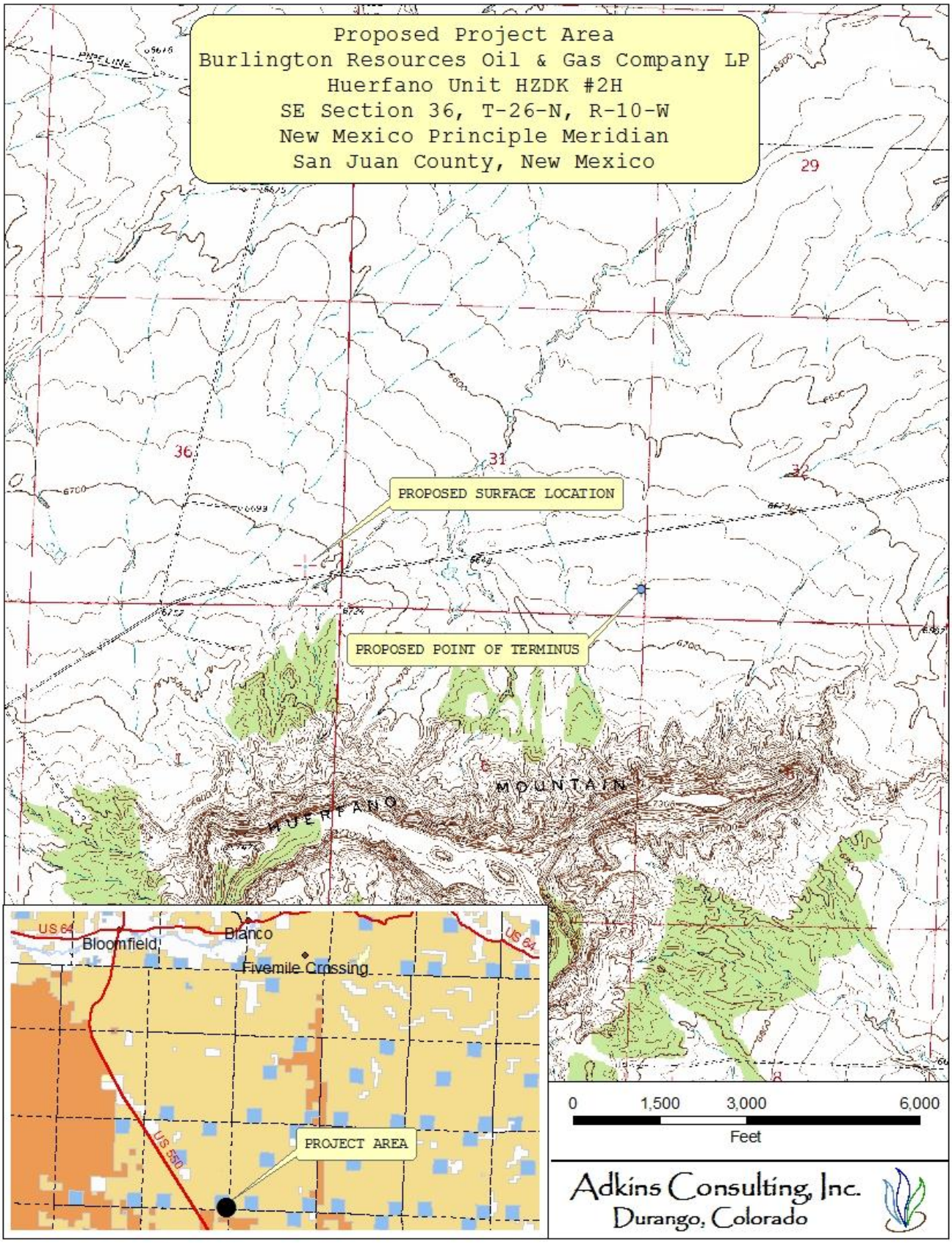
40 CFR All Parts and Sections inclusive Protection of Environment, Revised as of July 1, 2001.

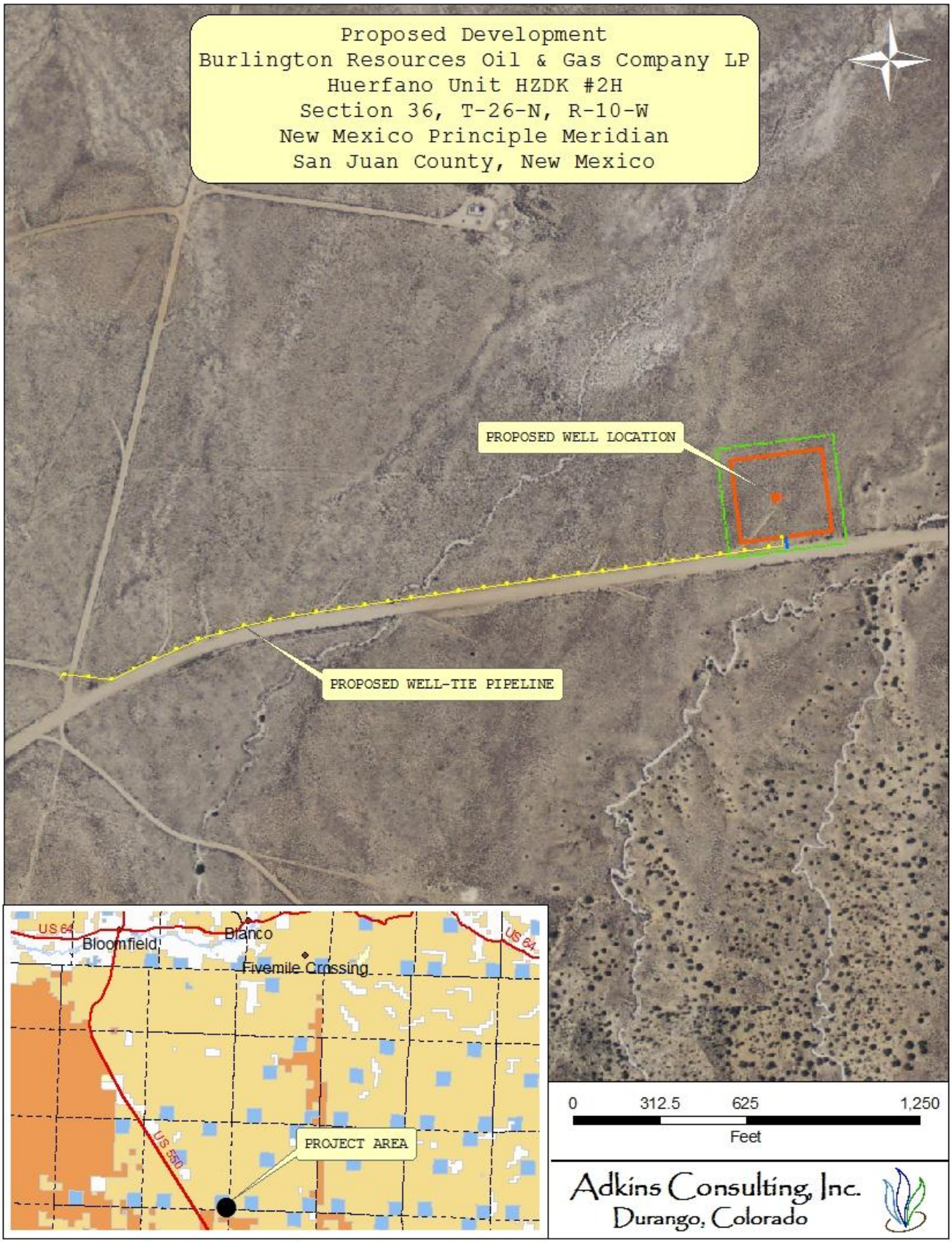
43 CFR, All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2000.

U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001.

The Federal Land Policy and Management Act, as amended. Public Law 94-579.

APPENDIX B. MAPS


Proposed Project Area
Burlington Resources Oil & Gas Company LP
Huerfano Unit HZDK #2H
SE Section 36, T-26-N, R-10-W
New Mexico Principle Meridian
San Juan County, New Mexico
PROPOSED SURFACE LOCATION
PROPOSED POINT OF TERMINUS
HUERFANO
MOUNTAIN
36
31
32
29
US 64
Bloomfield
Blanco
Fivemile Crossing
US 550
PROJECT AREA
0
1,500
3,000
6,000
Feet
Adkins Consulting, Inc.
Durango, Colorado


Proposed Development
Burlington Resources Oil & Gas Company LP
Huerfano Unit HZDK #2H
Section 36, T-26-N, R-10-W
New Mexico Principle Meridian
San Juan County, New Mexico
PROPOSED WELL LOCATION
PROPOSED WELL-TIE PIPELINE
US 64
Bloomfield
Blanco
Fivemile Crossing
US 64
US 550
PROJECT AREA
0
312.5
625
1,250
Feet
Adkins Consulting, Inc.
Durango, Colorado

P