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Logos Operating, LLC
Brannon Federal Wells 292H and 304H
Oil and Natural Gas Well Project

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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

New Mexico • Farmington Field Office

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1. PURPOSE AND NEED FOR ACTION

1.1. Background

Logos Operating, LLC (Logos) has submitted two Applications for Permit to Drill (APD) and one road Right-of-Way (ROW) Grant to the Bureau of Land Management – Farmington Field Office (BLM-FFO) for the Brannon Federal Wells 292H and 304H project. In addition, as part of the proposed project, Enterprise has submitted an application for a pipeline ROW grant. The proposed action is the approval of the ROW Grants and the approval of the APDs by the BLM-FFO located in Farmington, New Mexico.

The proposed project would include the horizontal drilling, production, and eventual plugging of the 292H and 304H wells. The wells would access oil and natural gas from the Gallup Formation. These minerals which are Federally-owned (Lease # 078309) are managed by the BLM-FFO and permitted with an APD by BLM-FFO

The proposed project would also include the construction, use, and reclamation of two associated well pads (approximately 5.74 and 6.03 acres per pad including construction zone and cutting pits per pad), as well as an associated access road for Well 304H, pipeline for Well 304H, existing access road upgrades for both well locations, and pipeline tie-ins. The total new construction area is 13.17 acres for both pad construction and road/pipeline construction. The Wells and Well construction zones would be permitted under their respective APDs. The access road would be located on lease and permitted under a ROW Grant. The pipeline for 304H would be located on-lease and permitted by a separate ROW Grant.

Oil and gas are important contributors to the United States energy resources. Approximately 55 percent of oil consumed in the United States and 84 percent of natural gas is produced in the U.S. (U.S. Department of Energy 2011). Many oil and gas reserves are concentrated throughout the United States within distinct fields or basins. The San Juan Basin is under the BLM-FFO management area jurisdiction.

The oil and gas industry is one of the largest private sector employers in New Mexico. As of 2012, taxes and royalties on oil, natural gas, and carbon dioxide production contributed approximately 25 percent of New Mexico's general fund; (New Mexico Bureau of Geology and Mineral Resources 2012). The federal government also receives royalties for the extracted federal minerals. In 2011, federal natural gas royalties totaled over 2 billion dollars (Office of Natural Resources Revenue 2012).

The proposed project area is located 30 miles south-southeast of the town of Bloomfield, New Mexico and 6 miles east-northeast of the community of Nageezi (see Figure 1, Appendix A).

1.2. Purpose and Need for Action

The purpose of the proposed action is to allow Logos reasonable access to BLM-managed lands to develop their mineral lease.

The need for the proposed action is established by the BLM's responsibility under the Mineral Leasing Act of 1920, as amended (MLA, 30 U.S. Code [USC] 181 et seq.), which authorizes the

BLM to lease public lands for the development of mineral deposits (including oil, gas, and other hydrocarbons) and permit the development of those leases. It is the policy of the BLM, as derived from several laws, including the MLA and Federal Land Policy and Management Act of 1976 (FLPMA, 43 USC 1701 et seq.), to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs. Per 43 Code of Federal Regulations (CFR) 3160 (Onshore Oil and Gas Operations), the BLM is required to respond to a request for an APD.

1.3. Decision to be Made

The BLM-FFO will decide whether or not to issue the APDs and ROW Grant associated with the Logos Wells 292H and 304H project, and if so, under what terms and conditions. Under the National Environmental Policy Act (NEPA; Public Law 91-90, 42 USC 4321 et seq.), the BLM-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 one of the following:

- To approve the two APDs and two ROW Grants with design features as submitted;
- To approve the two APDs and two ROW Grants with additional mitigation added;
- To analyze the effects of the proposed action in an EIS; or
- To deny the two APDs and two ROW Grants.

1.4. Conformance with Applicable Land Use Plan(s)

The Proposed Action is in conformance with the September 2003 Farmington Resource Management Plan with Record of Decision, as updated in December 2003 (BLM 2003a).

Specifically, the proposed action supports the following BLM policy:

> *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. (BLM 2003a,2-2–2-3)*

As required by NEPA, this EA addresses site-specific resources and effects of the proposed action that were not specifically covered within the Farmington Resource Management Plan/Final Environmental Impact Statement.

1.5. Relationship to Statutes, Regulations or Other Plans

Logos would comply with applicable federal, state, and local laws and regulations. Necessary permits and approvals for the project would be obtained prior to project implementation.

Any requirements regulating specific environmental elements are found in the appropriate elements sections of this EA (Chapter 3). Several permits, licenses, consultations, or other requirements are discussed below.

1.5.1. Clean Water Act

The proposed action is in conformance with the Clean Water Act, as amended (CWA; 33 USC 1251 et seq.).

Under Section 404 of the CWA, the U.S. Environmental Protection Agency (EPA) regulates the discharge of dredged or fill material into waters of the U.S., including wetlands. The Section 404 program is administered by the EPA and U.S. Army Corps of Engineers. A Section 404 permit is required for projects that would result in discharged material into a water of the U.S.

Under Section 402 of the CWA, the EPA regulates storm water discharges from industrial and construction activities under the National Pollution Discharge Elimination System program. Permits are required if discharge results in a reportable quantity for which notification is required (pursuant to 40 CFR 117.21, 40 CFR 302.6, or 40 CFR 110.6) or if the discharge contributes to a violation of a water quality standard.

Under Section 401 of the CWA, an applicant for a federal license or permit to conduct an activity that may result in a discharge into a Water of the U.S. must provide the federal agency with a Section 401 certification declaring that the discharge would comply with the CWA. The certification would be granted by the New Mexico Environment Department (NMED).

1.5.2. National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966 (NHPA; 16 USC 470) requires federal agencies to take into account the effects of their actions on historic properties, and allow the Advisory Council on Historic Preservation a reasonable opportunity to comment. Compliance with the requirements of the NHPA is met by following the 2014 Protocol Agreement between the New Mexico BLM and New Mexico State Historic Preservation Officer, which is authorized by the Programmatic Agreement among the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers (2012).

1.5.3. Clean Air Act

The Clean Air Act of 1972, as amended (CAA; 42 USC 7401 et seq.), establishes national ambient air quality standards (NAAQS) to control air pollution. In New Mexico, the NMED has adopted most of the CAA into the New Mexico Administrative Code ([NMAC] 2014). The NMED issues construction and operating permits for air quality and enforces air quality regulations and permit conditions.

1.5.4. New Mexico State Regulations

The New Mexico Oil Conservation Division (NMOCD), which is in the New Mexico Energy, Minerals, and Natural Resources Department (EMNRD), regulates oil and gas operations in New Mexico. The NMOCD has the responsibility of gathering production data, permitting new wells, establishing pool rules and allowables, issuing discharge permits, enforcing rules and regulations, monitoring underground injection wells, ensuring that abandoned wells are properly plugged, and ensuring that the land is responsibly restored (EMNRD 2014). Oil and gas regulations administered by NMOCD are contained in NMAC 19.15. These regulations include the following, with which Logos would comply:

- The EMNRD requires operators to follow “pit rule” guidelines (NMAC 19.15.17) to reduce groundwater contamination from industry-related activities.
- NMAC 19.15.15 establishes requirements for well acreage spacing, obtaining approval of unorthodox well locations, and pooling or communitizing small acreage oil lots.
- NMAC 19.15.16.19 requires the disclosure of hydraulic fracture constituents.

1.5.5. 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). No further consultation with the USFWS is required.

Water used during drilling operations would be obtained from Blanco Trading Post POD # SJ-02105. Additional water may be hauled from Hilltop Water Well POD #SJ-00077, San Juan Basin Water Hauling Association WR-SP03453. Water obtained from the sources listed above is already accounted for as a depletion to USFWS-listed fish habitat in the San Juan River. No new unaccounted-for water depletions would occur as a result of this project; therefore, there is no need for additional Section 7 consultation.

1.5.6. Migratory Bird Treaty Act

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.

1.6. Scoping, Public Involvement, and Issues

1.6.1. Scoping and Public Involvement

The BLM-FFO publishes a NEPA log for public inspection. This log contains a list of proposed and approved actions within the BLM-FFO. The log is located on the BLM's New Mexico website (http://www.blm.gov/nm/st/en/prog/planning/nepa_logs.html).

An on-site meeting, attended by LOGOS, BLM-FFO representatives, and two environmental consultants with ERO Resources Corporation (ERO), was held at the proposed project area on November 5, 2014.

The Huerfano chapter of the Navajo Nation was invited to the on-site meeting by the BLM-FFO; no members of the Navajo Nation attended the meeting. A public invitation to the on-site meeting was posted online (http://www.blm.gov/nm/st/en/fo/Farmington_Field_Office/ffo_oil_and_gas/ffo_onsites.html); no private citizens or groups attended the meeting. A BLM-FFO Interdisciplinary Team meeting was held on January 12, 2015 to discuss the proposed action. At the aforementioned meeting, potential issues of concern were identified by the BLM-FFO and provided to the contractor preparing the EA. No public comments were received for the proposed action.

Based on the size and scale, routine nature, and potential impacts associated with the proposed action, no additional external scoping was conducted.

1.6.2. Issues

Issues Analyzed

The following were identified as potential issues of concern for the proposed action. These issues will be addressed in this EA.

- How would dust and equipment emissions associated with the project impact air resources?
- How would vegetation-clearing, project activities, and final reclamation impact soils?
- Would drilling the proposed well impact groundwater?
- How would vegetation-clearing, project activities, and final reclamation associated with the project impact upland vegetation?
- How would vegetation-clearing, project activities, and final reclamation impact wildlife, including migratory birds?
- How would vegetation-clearing, project activities, and final reclamation impact the following BLM Special Status Species: American peregrine falcon (*Falco peregrinus anatum*), Aztec gilia (*Aliciella formosa*), Bendire's thrasher (*Toxostoma bendirei*), Brack's fishhook cactus (*Sclerocactus cloveriae* var. *brackii*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), pinyon jay (*Gymnorhinus cyanocephalus*), Townsend' big-eared bat (*Corinorhinus townsendi*i), and spotted bat (*Euderma maculatum*)?
- How would vegetation-clearing, project activities, and final reclamation impact the following Federally-listed threatened and endangered species: Bracks cactus (*Sclerocactus cloverae* ssp. *brackii*)?
- How would surface-disturbing activities associated with the proposed project impact cultural resources?

- How would the project affect human health and safety?
- Would the project have disproportionate effects on minority or low income populations?

Issues Considered but not Analyzed

The following issues were identified as issues of concern that would not be impacted by the proposed action or that have been covered by prior environmental review. These issues will not be analyzed in this EA.

- Native American Religious Concerns were reviewed and found to be absent.
- Groundwater: Two permitted water wells are within a 1-mile radius of the proposed Well 304H, one completed and one that is permitted, but does not appear to be completed (New Mexico Office of the State Engineer 2014). The wells are approximately 3,000 feet south east of the proposed Well 304H and approximately 5,000 feet distant from the directional bore. The completed well indicates ground water at a depth of 628 feet, with the water bearing layer a sandstone/gravel conglomerate. The well was drilled to 1180 feet below surface, and cased to 1165 feet below surface. There are no permitted water wells within a 1-mile radius of Well 292H.

  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 (EPA 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 (EPA 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 action is well below any underground sources of drinking water. The Mancos Shale formation is also 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 formations and provides an impermeable layer that isolates the Mancos Shale and Mesaverde formations from both identified sources of drinking water and surface water. On average, total depth of the proposed well bore would be about 5,000 feet below the ground surface. Fracturing in the Basin Mancos formation is not expected to occur above depths of 4,000 feet below the ground surface. Fracturing could possibly extend into the Mesaverde formation overlying the Basin Mancos; however, the 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 or groundwater are expected to occur from hydraulic fracturing of this proposed well.

Areas of Critical Environmental Concern (ACECs)

The closest ACEC to the project area is the Dzil'na'oodlii (Huerfano Mesa), a specially designated Native American traditional area, 2.4 miles north/northwest of the Well 292H and 2.8 miles north/northwest of Well 304H (BLM 2003b). The impacts to the ACEC would be negligible because the proposed actions would occur outside the ACEC and in previously disturbed areas. Visual effects associated with the project are minor and short-term, and given the distance of the effects from the ACEC as well as, should not affect the cultural values of the ACEC.

2. PROPOSED ACTION AND ALTERNATIVE(S)

2.1. Alternative A: No Action

Under the No Action Alternative, Wells 292H and 304H would not be approved. The proposed Wells and access road would not be constructed and the proposed wells would not be drilled. There would be no changes to current land and resource uses in the proposed project area.

2.2. Alternative B: Proposed Action

The proposed action is the BLM-FFO approval of two APDs and two ROW Grants associated with Logos proposed Wells 292H and 304H project. The proposed project would include the horizontal drilling, possible production, and eventual plugging of Federal Wells 292H and 304H wells. The wells would access oil and natural gas from the Mancos-Gallup Formation.

The proposed project would also include the construction, use, and reclamation of two Wells (5.74 and 6.03 acres including construction zone and cutting pits), as well as an associated access road (304H), existing access road upgrades for both Well locations, and pipeline tie-ins. In total 13.17 acres would be required for the project. The Wells and Well construction zones would be permitted through APDs. The new access road and pipeline would each be permitted under a separate ROW Grant.

The primary objective of the proposed Wells project would be to produce natural gas; however, it is likely that oil would be a byproduct and could eventually be primarily produced.

Project implementation is proposed to begin in the spring of 2015.

Construction plats associated with the proposed project are provided in Appendix B. Location of Proposed Project Area

Maps of the proposed project areas are provided in Appendix A. The proposed project areas are plotted on the Blanco Trading Post, New Mexico, 7.5-minute USGS quadrangle maps (Figure 1) and aerial photograph (Figure 2; Appendix A).

The proposed project areas are located within the BLM-FFO management area in San Juan County, New Mexico and on BLM-FFO surface within the San Juan Basin. The proposed

project areas are located approximately 30 miles south-southeast of the town of Bloomfield, New Mexico and 6 miles east-northeast of the community of Nageezi.

The general region surrounding the proposed project areas are characterized by badlands, rolling hills, and mesas. The proposed project areas are located at approximately 6,680 to 6,800 feet above mean sea level (AMSL).

The legal description for approximate center of proposed Well 292H is Section 28, Township 25 North, Range 9 West; New Mexico PM; Latitude/Longitude: 36.374729N/107.802767W; San Juan County, New Mexico. The legal description for the approximate center of proposed Well 304H is Section 29, Township 25 North, Range 9 West; New Mexico PM; Latitude/Longitude: 36.368084N/107.818396W. The Latitudes and Longitudes for the Surface and Bottoms holes for each well are show in Table 1 and Table 2.

Table 1. Proposed Well 292H Bottom and Surface Hole Locations (NAD83).

	Latitude	Longitude
Surface Hole	36.374729°North	107.802767°West
Bottom Hole	36.374897°North	107.820620°West

Table 2. Proposed Well 304H Bottom and Surface Hole Locations (NAD83).

	Latitude	Longitude
Surface Hole	36.368084°North	107.818396°West
Bottom Hole	36.367576°North	107.838391°West

2.2.1. Description of Proposed Project

Well 292H

Logos is proposing the development of approximately 5.74 acres for activities related to oil and gas production. The drilling method would include a closed loop system with a temporary 135 foot (ft) by 75 ft cuttings pit. No new access roads would be necessary for this well location. Improvements to approximately 9,868 ft of the existing access road (from the junction with the 304H existing access road) include gravel surface improvement. No additional turnout construction would be necessary along this existing road. A pipeline tie-in is proposed within the proposed well pad and existing access road. To complete the tie-in with Well 292H, two steel pipelines measuring 2-4” in diameter and each 184 feet in length would be installed at 4’ below ground surface within the existing disturbed area.. Detailed plan sheets are included in Appendix B. An existing well nearby would be used for access and for the pipeline tie-in (Federal 28 #002).

Well 304H

Logos is proposing the development of approximately 6.03 acres for activities related to oil and gas production. The drilling method would include a closed loop system with a temporary 135 ft by 75 ft cuttings pit. Approximately 788.83 ft of new, non-engineered, access road would be required. The access road would require a 20 ft right-of-way and two culverts. Improvements to approximately 5,974 ft of the existing access road would also be necessary and include: gravel surface improvement; one culvert; three low water crossings; two added turnout locations (150 ft in length by approximately 10 ft in width) according to the Gold Book (BLM 2007); and bar

ditches. Approximately 1150 ft of new pipeline corridor is proposed and would require an approximate 30 ft ROW; an alternative pipeline tie-in would be 1168.54 feet. The pipeline would tie-in to an existing Enterprise pipeline. Detailed plan sheets are included in Appendix B. An erosional feature/headcut would also be diverted around the well pad and into an existing drainage ditch that diverts water around the existing Federal 29 002E well pad that is directly northeast of the proposed pad.

Design Features and Best Management Practices

Logos would comply with BLM guidance and standards established in The Gold Book: Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (BLM 2007). The following general design features and best management practices (BMPs) would occur:

Protection of Cultural Resources

In the event of a cultural discovery during construction, Logos would 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., eligible for the National Register of Historic Places (NRHP) or protected under NAGPRA or ARPA), it would be protected in place until mitigating measures could be developed and implemented according to guidelines set by the BLM.

Protection of Paleontological Resources

If a paleontological site is discovered, the BLM would be notified and the site would be avoided by personnel, personal vehicles, and company equipment. Workers would be informed that it is illegal to collect, damage, or disturb some such resources, and that such activities are punishable by criminal and/or administrative penalties.

Control of Waste

Liquid and solid wastes would be disposed of at an appropriate waste-disposal site. The proposed project area would be maintained in a sanitary condition. Hazardous substances would be handled and disposed of according to federal law.

Protection of Water Resources

The well associated with the connected action would have a closed-loop system; there would be no reserve pit associated with the well.

During all phases of the project (construction, drilling, production/operation, and reclamation) surface water run-off and hazardous materials would be managed to provide for protection to water resources, in compliance with standards set forth by the BLM (BLM, 2007) and site-specific considerations described in the Surface Use Plan of Operations (Appendices C and D). For example, to prevent release to the environment the cuttings pit would be contained with a 20-milligram string re-enforced material and constructed to meet the NMOCD pit guidelines. A containment berm would be constructed completely around any production facilities which contain fluids (i.e., production tanks, produced water tanks, etc.). Use of hazardous substances and chemicals would be restricted as described in Appendices C and D, the Surface Use Plan of Operations, and any spills of non-freshwater fluids would be immediately cleaned up and

removed to an approved disposal site. Spills would be reported as required by the BLM-FFO and in accordance with the requirements *of Notice to Lessees NTL-3A*. All fluids, waste and produced water would be disposed of at an appropriate facility. Construction standards which divert water around the Well area and preserve water flow beneath roads would prevent contaminated water run-off during storms. Interim and final reclamation would prevent erosion and preserve natural water flow during high-water periods.

Protection of Flora and Fauna, including Special Status Species and Livestock

Because the proposed project would disturb more than 4.0 acres of vegetation, if construction activities would occur during the migratory bird breeding season (May 15 through July 31), a migratory bird nest survey would take place one to two days prior to construction. This survey would be conducted by a BLM-FFO-approved biologist following BLM-FFO protocol. If, during the nest survey or during construction, active nests are located within or adjacent to the proposed project area, the BLM-FFO biologist would be notified and project activities would not be permitted until fledging has occurred. If postponement is not an option, the operator would contact the USFWS's Migratory Bird Permit Office regarding permitting. Should any active raptor nests be observed within 0.33 mile of the proposed project area or should any Special Status Species be observed within the proposed project area prior to or during construction, construction would cease and the BLM-FFO would be immediately contacted. The BLM-FFO would then ensure evaluation of the resource. Should a discovery be evaluated as significant (protected under the ESA, etc.), it would be protected in place until mitigation could be developed and implemented according to guidelines set by the BLM.

Livestock grazing operators in the vicinity of the proposed project area would be contacted by Logos at least 10 days prior to construction. No holes would be left open overnight. Open holes would be barricaded to ensure the safety of livestock. The temporary cuttings pit would be fenced and covered adequately to protect livestock.

Huerfano and Huerfano Community Grazing Allotments cover the project area. The Navajo Nation is the operator for the Huerfano Community allotment. For Huerfano Grazing Allotment, the operator is Cathleen Sterling.

Examples of design features that protect the livestock resource, operators and project proponent include:

- If livestock are present, providing monitors or barriers to ensure livestock do not come into contact with hazards (i.e., fencing of exposed ditch-type holes and covering smaller holes is required during each active bore hole construction during periods when personnel are not present on the site).
- Permittees would be contacted prior to construction activities. [Mandatory]
- Safety meetings or briefs to employees to increase awareness about livestock (i.e., open range and driving speeds to avoid livestock collisions).
- Containment of any contaminants, fluid leaks, or hazards that could cause injury to livestock (i.e antifreeze for compressors, drilling pits, equipment, pump jacks).

Wildlife hazards associated with the project would be fenced, covered, and/or contained in storage tanks, as necessary. The well associated with the proposed action would have a closed-

loop system; there would be no reserve pit associated with the well. The temporary cuttings pit would be fenced and covered adequately to protect wildlife.

Prevention and Control of Weeds

It would be Logos' responsibility to monitor, control, and eradicate all invasive, non-native plant species within the proposed project area throughout the life of the project. Logos' weed-control contractor would contact the BLM-FFO regarding the BLM-FFO's Bare Soil Reclamation procedure to learn acceptable weed-control methods for the Blanco area. Principles of integrated weed management would be used including chemical, mechanical, and biological control methods.

If the contractor does not hold a current Pesticide Use Permit, a Pesticide Use Permit would be submitted prior to pesticide application. Only pesticides authorized for use on BLM lands would be used. The use of pesticides would comply with federal and state laws. Pesticides would be used only in accordance with their registered use and limitations. Logos' weed-control contractor would contact the BLM-FFO prior to using these chemicals to ensure that an approved Pesticide Use Proposal (PUP) is in place for all planned herbicide applications. Herbicides would be applied by a certified applicator. A Biological Use Proposal is required by the Farmington Field Office and would be prepared prior to the use of any new biocontrol agents.

No weeds were found in the area during the on-site visit on November 5, 2014. If noxious weeds were found, a report would be prepared and provided to the BLM Weed coordinator prior to the disturbance occurring, and also documented in the annual reclamation report. The report would include:

- A GPS location recorded in North American Datum 1983
- Species
- Canopy cover or number of plants
- Size of infestation (estimate of square feet or acres)

Logos would inventory and document noxious and invasive plant infestations before reclamation actions begin.

Protection of Topsoil

Topsoil, which would be stripped from the surface of the proposed project area during the construction phase of the proposed project, would be stored and protected until it is redistributed during reclamation. Topsoil would be stored within the construction zone separately from subsoil material. The topsoil would be free of brush, tree limbs, trunks, and roots. Vehicle/equipment traffic would not be allowed to cross topsoil stockpiles. The topsoil would be protected using wattles or other BMPs so that erosion is minimized. If topsoil is stored for a length of time such that nutrients are depleted from the topsoil, amendments would be added to the topsoil as advised by a Logos or contractor appropriate agent/contractor.

Protection of Air Resources

The BLM's regulatory jurisdiction over field production operations has resulted in the development of BMPs designed to reduce impacts to air quality by reducing all emissions from field production and operations. Typical measures could include flaring hydrocarbons and gases

at high temperatures in order to reduce emissions of incomplete combustion, requiring that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored, ensuring that compressor engines 300 horsepower or less have nitrogen oxide (NOx) emissions limited to 2 grams per horsepower hour, re-vegetating areas not required for production facilities to reduce the amount of dust, and watering dirt roads during periods of high use in order to reduce fugitive dust emissions. Magnesium chloride, organic-based compounds, or polymer compounds could be also be applied to roads or other surfaces to reduce fugitive dust. Petroleum-based products or produced water would not be used.

Protection of the Public

The hauling of equipment and materials for the project on public roads would comply with Department of Transportation regulations. Logos would notify the public of potential hazards by posting signage, as necessary.

Additional Design Features and BMPs

Vehicles would be restricted to proposed disturbance areas and existing areas of surface disturbance, such as existing roads and Wells.

Worker safety incidents would be reported to the BLM-FFO as required under Notice to Lessees (NTL) -3A (USGS 1979). Logos would adhere to company safety policies, Occupational Safety and Health Administration regulations, and Department of Transportation regulations.

Logos would comply with Onshore Oil and Gas Order No. 2, issued under Onshore Oil and Gas Operations (43 CFR 3160).

Proposed Project Phases

Under the proposed project, the following phases would occur.

Construction of Well and Access Road

The well pad, pipeline, access road construction (Well 304H only), and existing access road improvement phase is expected to be approximately 7 to 15 days.

The proposed well pad and access road would be cleared of vegetation. The vegetation (including bushes less than 3 inches in diameter [at ground level] and slash/brush) would be chipped or mulched and incorporated into the topsoil as additional organic matter. The sites do not contain trees, and no trees would be removed.

The top 6 inches of topsoil, or as much as possible, would be stripped and stockpiled within the construction zone. The protection of topsoil is discussed in “Design Features and Best Management Practices – Protection of Topsoil,” above.

The proposed access road (Well 304H only) and well pad would be leveled with a D-8 bulldozer to provide space and a level surface for vehicles and equipment. Excavated materials from cuts would be used on fill portions of the location. Construction would utilize native soil and materials available onsite.

The proposed access road for Well 304H would be designed and maintained in accordance with the Gold Book (BLM 2007) standards and BLM Manual 9113, Sections 1 and 2 (BLM 2011a

and BLM 2011b). The road would be 788.83 ft long. The 20-foot-wide road corridor would accommodate clearing, cut-and-fill slopes, and drainage ditches. Within the corridor, there would be a 15-foot-wide running surface with turnouts, as necessary, and adequate crowning and drainage on both sides. The proposed access road would be built up 18 to 24 inches following Gold Book (BLM 2007) standards. The maximum road grade would be 4 percent. The road would be constructed to meet the standards for anticipated traffic flow and all-weather requirements. Surfacing material would be used, as necessary. 24-inch-diameter culverts would be placed beneath the access road, where needed.

Logos proposes to construct a subsurface pipeline between 184 feet in length adjacent to the new well pad for 292H to connect the well with an existing pipeline. The pipeline will be installed within an existing disturbed area (pad and access road). For well 304H, 1168.54-foot of new pipeline corridor will be installed along the south side of an existing pad (see detailed plan sheets, Appendix B). The pipeline corridor will cross BLM public lands and tie in to Enterprise Pipeline on a 3rd Party well pad. The pipelines would be constructed in accordance with the Gold Book (BLM 2007). For each pipeline installation, two steel pipes measuring 2 to 4 inches in diameter will be buried at a depth of approximately 4 feet, one for delivery of product for sale, and another "buyback" pipe which will be used by Logos for well optimization. Logos will mark the exterior boundaries of the proposed pipeline right-of-way with stake and/or lath at 100 to 200 foot intervals. Logos will maintain all boundary stakes in place until final clean up and restoration is completed. The stakes will be removed upon completion.

The proposed well pads would generally measure 400 by 400 feet with an additional 50 to 75-ft buffer of disturbed area for grading surrounding each pad (refer to plats in Appendix B). For Well No. 304H, the maximum well pad cut would extend an additional 25 feet along the A^1-C^1 (northern) edge to account for the additional slope cut and silt trap needed to divert an arroyo. The maximum well pad fill would be 5 feet on the northeastern corner (corner 3). For Well No. 292H, the maximum well pad cut would be 1-2 feet along the southern edge and the maximum fill would be 5-7 feet on the northwestern corner. The size of the proposed well pad is slightly larger than typical well pad in the BLM-FFO area because the equipment (such as tanks) associated with the new hydraulic fracturing design requires a larger area. Equipment would be staged on the well pad.

Drilling and Completion

Once construction is complete, a drilling rig would be transported to the well pad and assembled. Horizontal drilling typically takes approximately 30 days for the well. Once drilling is complete, the well would be completed (the process in which the well is enabled to produce oil and natural gas). Completion typically takes 30 days.

Facilities and equipment on the location during this time could include the following:

- Drilling rig
- Generator(s)
- Water and mud tanks
- Mud pumps
- Safety stations
- Equipment and material storage units
- Fuel storage

- Equipment control room
- Construction trailers

Various service company equipment (cement trucks, fracturing trucks & equipment, wireline trucks, etc.) and approximately 10 to 40 personnel would be on the proposed site at any time during drilling and completion.

During this process, vehicles would use existing access roads, as well as developed roads and highways in the region. Traffic would include light vehicles (such as cars and pick-up trucks) and heavy vehicles (such as water trucks and large tractor-trailers hauling equipment). Approximately 5 to 40 vehicle trips per day would be required during construction, drilling, and completion activities.

Water for drilling would be obtained from Blanco Trading Post POD #SJ-02105. Additional water may be hauled from Hilltop Water Well POD #SJ-00077, San Juan Basin Water Hauling Association WR-SP03453, or Basin Disposal using Bloomfield city water. Logos would ensure that water would be obtained legally and that all required permits would be obtained prior to obtaining water.

Surface casing would be installed to a depth necessary to penetrate past freshwater zones. The casing would be pressure-tested to ensure that a seal has been created.

A temporary cuttings pit would be used. Drill cuttings, drill water, and completion fluids would be placed in the closed-loop system. Any other fluids or hazards on the location would be contained or fenced and properly maintained to ensure the safety of livestock and wildlife.

Interim Reclamation

Some portions of the proposed project area would be fully reclaimed, some portions would only be reseeded, and some portions would not be reclaimed during interim reclamation if the well proves to be productive. Areas that would be fully reclaimed, reseeded only, or left un-reclaimed during this phase are described in Section 2.1.3 (Surface Disturbance). As discussed in Section 2.1.3, the staging area would be reseeded during interim reclamation. Details of the interim reclamation process (including species included in the seed mixture) are provided in the Surface Reclamation Plan (Appendices C and D).

Interim reclamation would be initiated within 120 days of construction. The BLM-FFO would be notified at least 48 hours prior to the start of interim reclamation activities. Interim reclamation could occur simultaneously with production.

During this phase, a tractor with seeding capabilities and a bulldozer would be used for reclamation purposes. About three to four personnel would be required to conduct interim reclamation. In areas that would be fully reclaimed, slopes would be re-contoured to pre-construction topographical contours, if possible. Logos would diminish the evidence of cuts, fills, and flat Well surfaces.

In areas that are to be fully reclaimed or just reseeded, stockpiled topsoil (if available) would be redistributed and the surface would be ripped and seeded. Sediment- and erosion-control

features (including water diversions, silt traps, and 24-inch-diameter culverts) would be installed, as necessary. The BLM-FFO Sagebrush-Grass Community Seed Mixture would be used.

Under Appendix B (ROW POD [Plan of Development] Procedure) of the BLM-FFO Bare Soil Reclamation Procedures (BLM 2013), Logos is responsible for monitoring and reporting (per Section A.4.2) and the BLM-FFO is responsible for monitoring reclaimed rights-of-way per Section B.4.1 (Surface Reclamation Plan, Appendices C and D).

Production

The production phase of wells varies; the lifetime is anticipated to be 30 to 50 years. Production equipment that would remain on the Well could include the following:

- Wellhead
- Production unit
- Meter run
- Compressor
- Flare stack
- Water tanks
- Oil tanks

The layout of production facilities would be deferred until after the drilling phase is completed. Logos would determine the lay-out with consultation from the BLM-FFO. A likely scenario is that production facilities would be located within a 300- by 100-foot facility area at the eastern end of the proposed Well. The tear drop for the Well would consist of a looped, 35-foot-wide driving surface; the tear drop would be used to access the wellhead and other facilities. This scenario has been used for calculating the extent of surface disturbances. Production facilities would be painted Carlsbad Brown.

Site security guidelines would be followed, as identified in 43 CFR 3162.7-5 and Onshore Oil and Gas Order No. 3. With the exception of equipment subject to safety requirements, equipment would be painted Carlsbad Brown to blend with the surrounding environment. Production facilities would be placed, to the extent practical, to minimize visual impacts.

Production would comply with noise standards outlined in NTL 04-2 FFO (BLM 2004).

During production, normal upkeep would be required to monitor production and resolve any problems. It is anticipated that one pick-up truck would visit the proposed Well daily during the normal work week.

Occasionally, work-over or recompletion of the proposed well would be necessary to ensure that efficient production is maintained. Work-overs and recompletions would be scheduled as needed to improve and maintain production of the well. Work-over activities could include repairs to the wellbore equipment (e.g., casing, tubing, rods, and pump), wellhead, or production facilities.

Interim Reclamation, Final Reclamation and Abandonment

Roads would be designed and constructed to allow for successful interim and eventual final reclamation. Re-vegetation of road ditches and cut and fill slopes would help stabilize exposed

soils and reduce sediment loss, reduce the growth of noxious weeds, reduce maintenance costs, maintain scenic quality and forage, and protect habitat. To ensure successful growth of plants and forbs, topsoil would be salvaged where available during road construction and re-spread to the greatest degree practical on cut slopes, fill slopes, and borrow ditches prior to seeding. To ensure the stability of freshly top-soiled slopes during re-vegetation, the application of mulch or other sediment control measures may be appropriate. Under Appendix B (ROW POD [Plan of Development] Procedure) of the BLM-FFO Bare Soil Reclamation Procedures (BLM 2013), Logos is responsible for monitoring and reporting (per Section A.4.2) and the BLM-FFO is responsible for monitoring reclaimed rights-of-way per Section B.4.1 (Surface Reclamation Plan, Appendices C and D).

When the well is no longer commercially viable, or if the well proves to be unproductive it would be plugged and abandoned. Downhole well abandonment would be carried out under current BLM-FFO and state regulations. The bore would be plugged with cement and the production facilities would be removed. An aboveground marker would be placed over the plugged hole. The marker would contain individual well identification information.

Details of the final reclamation process (including species included in the seed mixture) are provided in the Surface Reclamation Plan (Appendices C and D). The final reclamation phase is anticipated to take less than one week. During this phase, a tractor with seeding capabilities and a bulldozer would be used for reclamation purposes. Logos would provide the BLM-FFO with technical and environmental aspects of the final plugging, abandonment, and reclamation procedures.

The goal of final reclamation would be to return disturbed areas associated with the project to pre-construction conditions, if possible, by diminishing the evidence of cuts, fills, and flat surfaces. About three to four personnel would be required. Portions of the project area that were not fully reclaimed during interim reclamation would be cleared (if vegetated), re-contoured to pre-construction topographical contours, covered with salvaged topsoil, and seeded. Re-seeding would occur with consultation with the BLM to ensure favorable conditions (season/weather) and moisture for seed germination. Sediment- and erosion-control measures would be implemented, as necessary. Water bars would be installed across the road(s), and dead-end ditches and earthen barricades would be constructed at the entrance to reclaimed areas. Measures would be taken to control sedimentation and erosion, as necessary.

2.2.2. Surface Disturbance

Table 3, below, summarizes the disturbance and reclamation acreage associated with the proposed project. The access road, well pad, and well pad construction zone associated with the proposed project would result in 13.17 acres of new disturbance. Of this, 9.99 acres would be reseeded (but not re-contoured) during interim reclamation and 2.91 acres would remain disturbed throughout the life of the project would be reseeded at the end of the project. All acreage would be fully reclaimed (reseeded and re-contoured) at the end of the project.

Table 3. Extent of Surface Disturbance on BLM Lands.

	Total acres disturbed	Acres disturbed during life of project (Permanent)	Acres reseeded during interim reclamation (Temporary)	Acres fully reclaimed at end of project (re-seeded and re-contoured)
New access road (304H)	0.36	0.25	0.11	0.36
New pipeline (304H)	0.80	0.00	0.54	0.54
Wells (292H and 304H)	11.77	2.52	9.25	11.77
Road improvements (two turnouts 304H)	0.24	0.14	0.1	0.24
TOTAL	***13.17***	***2.91***	***9.99***	***12.91***

Project features are described further below.

Access Road Corridor

The access road corridor (Well 304H) would be 20 feet (ft) wide and 788.83 ft long. Disturbance from the new access road would be approximately 0.36 acre.

The 14-ft-wide running surface of the new access road (approximately 0.25 acre, total) would remain disturbed for the lifetime of the project. The remainder of the access road corridor (0.11 acre) would be reseeded during interim reclamation.

Pipeline and Pipeline tie-in

For Well No. 304H, a proposed 1168.54-foot new pipeline corridor would be installed (see Appendix B). The new pipeline corridor would require an approximate 30 ft ROW, and would disturb approximately 0.80 acres for the 1168.54-foot pipeline alternative. The pipeline would tie-in to an existing Enterprise pipeline. The 30-ft-wide corridor would be reseeded during interim reclamation.

For Well No. 292H, an installation of 184 feet of pipeline would be required to tie in the well to the existing Enterprise pipeline. Approximately 0.169 acre will be required for the tie-in for Well 292, and will occur within the existing access road and pad area. No new disturbance would occur for the tie-in

For each pipeline installation, two steel 2”-4” pipes would be necessary: one for direct sales of product, and one “buy-back” line used for well optimization (adjustments to well-head pressure). Construction methods including trenching, as well as reclamation are detailed for each well in the Surface Use Plan of Operations (Appendix C and D).

Wells

The well pad’s disturbance footprints would measure about 500 by 500 ft (5.74 acres) for Well No. 292H and 500 by 525 ft (6.03 acres) for Well No. 304H. The entire level surface on each pad, measuring 400 by 400 ft, would be needed during drilling operations. Once drilling and completion operations conclude (this process takes about 60 days), portions of the level pad and surrounding construction zone, including slope and fill, would undergo interim reclamation and

be re-seeded (refer to Surface Use Plan of Operations and Surface Reclamation Plan, Appendices C and D.

Specific facility lay-out plans would be deferred until after drilling is complete. A likely scenario is that on the surface of the pad, approximately 1.26 acres, known as the "non-reseed working area," would remain disturbed for the lifetime of the proposed project. Under this scenario, the non-reseed working area would consist of the following:

- A facility area approximately 300 by 100 ft (0.69 acre), located along one side of the Well.
- A driving surface teardrop-shaped and 35 ft wide (0.57 acre), located within the center of the Well.

All other areas (9.25 acres total for both pads), including the pad surface and the surrounding slope/fill boundaries, would be reseeded, but not re-contoured. Approximately 0.95 acre for each pad, known as the "reseed working area," would still be used but not needed daily. The reseed working area would consist of the following:

- The center of the teardrop, approximately 0.47 acre.
- An approximately 210- by 180-ft (0.87-acre) area around the wellhead required for potential future activities, but not be used for daily activities. After accounting for the portion of this polygon that overlaps the teardrop and teardrop center, this region measures 0.48 acre.

Construction Zone

A 50-foot-wide (2.07-acre) construction zone would surround Well 292H and a 50-foot-wide (with 75-foot-wide on south side) construction zone would surround Well 304H. The zone is included in the overall disturbance calculations. Approximately 0.03 acre of the construction zone would overlap the access road for each pad. Two temporary biological restriction fences (excluding the cuttings pit which occupies an approximately 0.23-acre area on each pad) would be placed near corner 1 for Well 292H and corner 5 for 304H. The cuttings pit to be fenced is depicted on the plats (Appendix B).

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Under the No Action alternative, current land and resource issues within the proposed project area would continue; there would be no new impacts from oil and gas development. The No Action alternative will serve as the baseline for comparing the environmental impacts of the analyzed alternatives, and will not be further evaluated in this EA (BLM 2008a).

The proposed project area occurs within a sagebrush shrublands, characterized by big sagebrush (*Artemesia tridentata*), on level to gently rolling terrain with sandy soils (photos 1 and 2). The older sagebrush stand has large interspaces with limited forb and bunchgrass abundance and diversity. Patches of grama grass exist in places. The landscape is arid with a few ephemeral drainages in the vicinity of the project area.

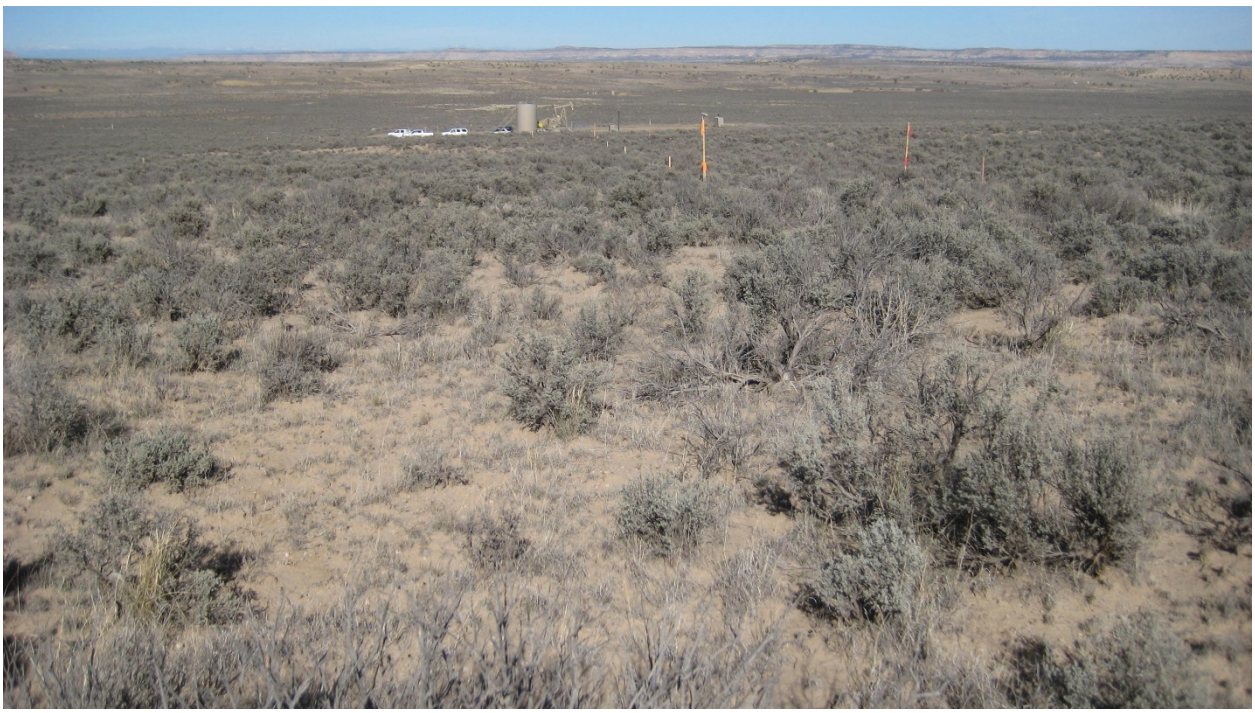

Photo 1. Proposed drill location for Well 304H, view to northeast showing existing well Federal 29 #002E.

Photo 2. General location for Well No 292H looking East to existing Well Federal 28 #002.

3.1. Air Resources

3.1.1. Affected Environment

The proposed wells are 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 (BLM 2003b). In addition, new information about greenhouse gases (GHGs), and their effects on national and global climate conditions has emerged since PRMP/FEIS 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 Resources Technical Report (BLM 2014). 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 (PM_{10} and $PM_{2.5}$), 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 Resources Technical Report (BLM 2014) 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. EPA's Green Book web page reports that all counties in the FFO area are in attainment of all NAAQS as defined by the Clean Air Act (EPA 2013). The area is also in attainment of all state air quality standards (NMAAQS*)*. The current status of criteria pollutant levels in the FFO are described below. Total emissions of criteria pollutants from each source sector were calculated by adding together the emissions from the four counties that are located in FFO: San Juan, McKinley, Rio Arriba, and Sandoval.

"Design Concentrations" are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. The 2012 design concentrations of criteria pollutants are listed below in Table 4. There is no monitoring for CO and lead in San Juan County, but because the county is relatively rural, it is likely that these pollutants are not elevated. PM10 design concentrations are not available for San Juan County.

Table 4. 2012 Criteria Pollutant Monitored Values in San Juan County.

Pollutant	2012 Design Concentration	Averaging Time	NAAQS	NMAAQS
O_3	0.071 ppm	8-hour	0.075 ppm[1]	
NO_2	13 ppb	Annual	53 ppb[2]	50 ppb
NO_2	38 ppb	1-hour	100 ppb[3]	
$PM_{2.5}$	4.7 µg/m^3	Annual	12 µg/m^3[3,4]	60 µg/m^3[3,6]
$PM_{2.5}$	14 µg/m^3	24 hour	35 µg/m^3[3,3]	150 µg/m^3[3,6]
SO_2	19 ppb	1-hour	75 ppb[5]	

[1] Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
[2] Not to be exceeded during the year
[3] 98th percentile, averaged over 3 years
[4] Annual mean, averaged over 3 years
[5] 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[6] The NMAAQS is for Total Suspended Particulate (TSP)
Source: EPA 2014

In 2005, the EPA estimates that there was less than 0.01 ton per square mile of lead emitted in FFO counties, which is less than 2 tons total (EPA 2005). Lead emissions are not an issue in this area, and will not be discussed further.

Air quality in a given region can be measured by its Air Quality Index value. The air quality index (AQI) is reported according to a 500-point scale for each of the major criteria air pollutants, with the worst denominator determining the ranking. For example, if an area has a CO value of 132 on a given day and all other pollutants are below 50, the AQI for that day would be 132. The AQI scale breaks down into six categories: good (AQI<50), moderate (50 to 100), unhealthy for sensitive groups (100 to 150), unhealthy (>150), very unhealthy and hazardous. The AQI is a national index, the air quality rating and the associated level of health concern is the same everywhere in the country. The AQI is an important indicator for populations sensitive to air quality changes.

Mean AQI values for San Juan County were generally in the good range (AQI<50) in 2013 with 80 percent of the days in that range. The median AQI in 2013 was 42, which indicates "good" air quality. The maximum AQI in 2013 was 156, which is "unhealthy".

Although the AQI in the region has reached the level considered unhealthy for sensitive groups on several days almost every year in the last decade, there are no patterns or trends to the occurrences (Table 5). On 8 days in the past decade, air quality has reached the level of "unhealthy" and on two days, air quality reached the level of "very unhealthy". In 2009 and 2012, there were no days that were "unhealthy for sensitive groups" or worse in air quality. In 2005 and 2013, there was one day that was "unhealthy" during each year. In 2010, there were five "unhealthy" days and two "very unhealthy days".

Table 5. Number of Days classified as "unhealthy for sensitive groups" (AQI 101 to 150) or worse.

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Days	3	6	9	18	1	0	12	9	0	1

Source: EPA 2013

Hazardous Air Pollutants

The Air Resources 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 (BLM 2014). The EPA conducts a periodic National Air Toxics Assessment (NATA) that quantifies HAP emissions by county in the U.S. The purpose of the NATA is to identify areas where HAP emissions result in high health risks and further emissions reduction strategies are necessary. A review of the results of the 2005 NATA shows that cancer, neurological and respiratory risks in San Juan County are generally lower than statewide and national levels as well as those for Bernalillo County where urban sources are concentrated in the Albuquerque area (EPA 2005).

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 6 shows climate normals for the 30-year period from 1981 to 2010 for the Farmington, New Mexico, area.

Table 6. Climate Normals for the Farmington Area, 1981-2010.

Month	Average Temperature (°F)	Average Maximum Temperature (°F)	Average Minimum Temperature (°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: Data collected at New Mexico State Agricultural Science Center – Farmington

Very recently, pioneering research using space-borne (satellite and aircraft) determination of methane concentrations have indicated anomalously large methane concentrations may occur in the Four Corners region (Kort, Frankenberg, Costigan, Lindenmaier, Dubey, & Wunch, 2014). A subsequent study (Schneising, Burrows, Dickerson, Buchwitz, Reuter, & Bovensmann, 2014) indicated larger anomalies over other oil and gas basins in the U.S. Methane is 34 times more potent at trapping greenhouse gas emissions than CO_2 when considering a time horizon of 100 years (Intergovernmental Panel on Climate Change, 2013). While space-borne studies can determine the pollutant concentration in a column of air, these studies cannot pinpoint the specific sources of air pollution. Further study is required to determine the sources responsible for methane concentrations in the Four Corners region; however, it is known that a significant amount of methane is emitted during oil and gas well completion (Howarth, Santoro, & A.Ingraffea, 2011). Methane is also emitted from process equipment, such as pneumatic controllers and liquids unloading, at oil and gas production sites. Ground-based, direct source monitoring of pneumatic controllers conducted by the Center for Energy and Environmental Resources (Allen, et al., 2014) show that methane emissions from controllers exhibit a wide range of emissions and a small subset of pneumatic controllers emitted more methane than most. Emissions measured in the study varied significantly by region of the U.S., the application of the controller and whether the controller was continuous or intermittently venting. The Center for Energy and Environmental Resources had similar findings of variability of methane emissions from liquid unloading (Allen, et al., 2014a). In October 2012, USEPA promulgated air quality regulations controlling VOC emissions at gas wells. These rules require air pollution mitigation measures that reduce the emissions of volatile organic compounds. These same mitigation measures have a co-benefit of reducing methane emissions. Future ground-based and space-

borne studies planned in the Four Corners region with emerging pollutant measurement technology may help to pinpoint significant, specific sources of methane emissions in the region.

The Air Resources Technical Report summarizes information about greenhouse gas emissions from oil and gas development and their effects on national and global climate conditions. While it is difficult to determine the spatial and temporal variability and change of climatic conditions; what is known is that increasing concentrations of GHGs are likely to accelerate the rate of climate change.

3.1.2. Impacts from Alternative B: Proposed Action

Methodology and assumptions for calculating air pollutant and greenhouse gas emissions are described in the Air Resources Technical Report. 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 (BLM 2014). Also incorporated into this document are the sections describing the assumptions used in developing the inputs for the calculator (BLM 2014).

Direct and Indirect Impacts

Table 7 shows estimated emissions from two proposed horizontal gas wells for criteria pollutants, volatile organic compounds (VOC) and greenhouse gas (GHG). For comparison, Table 8 shows total human-caused emissions for each of the counties in the FFO, based on USEPA's 2011 emissions inventory (EPA 2011).

Table 7. Criteria Pollutant and VOC Emissions Estimated for Construction of Two Horizontal Gas Wells; Average 25 Days Each to Drill and Complete.

Activity	NOx	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2
One time operations (tons)*								
Construction	11	3	1	5	0.5	0.2	0.014	1197.7
Completion	1	0.2	0.06	0.05	0.05	-	-	110
Interim Reclamation	0.012	0.012	0.012	0.002	-	0.006	-	2.48
Final Reclamation	0.012	0.012	0.012	0.002	-	0.008	-	3.32
Ancillary Operations (tons)								
Workover	0.258	0.08	0.02	0.02	0.02	-	-	21.18
Road Maintenance	-	-	-	-	-	-	-	0.52
Road Traffic	-	-	-	-	-	-	-	0.12
Annual operations (tons/yr)								
Oil Haul Truck and Small Truck (100 bbl/day)	0.018	0.012	0.0024	0.0018	0.0016	-	0.0002	7.76
Total	**12.282**	**3.304**	**1.104**	**5.074**	**0.57**	**0.214**	**0.014**	**1335.32**

Oil storage tanks on the well location may result in venting of VOC. Oil well production is generally presented as barrels per day produced. The emissions calculator estimated that for every barrel per day produced there may be 0.12 tons of VOC vented per year.

The average horizontal oil well in the planning area produces approximately 100 barrels per day. One hundred barrels per day is estimated to result in 12 tons of VOC emissions per year. Oil storage tanks would be subject to current EPA regulations regarding the capture or flaring of VOC emissions.

Table 8. Analysis Area Emissions in Tons/Year, 2011.

County	NO_X (1)	CO (2)	VOC (3)	PM_{10} (4)	$PM_{2.5}$ (5)	SO_2 (6)
McKinley	11,952.9	17,007.8	3,891.2	70,096.4	7,645.2	1,381.1
Rio Arriba	12,012.3	27,344.6	19,149.8	33,761.2	4,130.6	60.4
San Juan	42,231.5	63,568.9	26,110.8	76,638.3	9,201.0	5,559.3
Sandoval	4,143.8	19,513.9	4,373.1	39,343.0	4,510.8	109.3
La Plata	4,838.2	17,116.3	3,740.1	2,330.0	919.6	127.9
Total	**75,187.7**	**144,551.5**	**57,265.1**	**222,168.9**	**26,407.2**	**7,237.9**

(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 9 displays the percent increase in total emissions in the analysis area from the proposed action to construct and operate two horizontal gas wells.

Table 9. 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	150375.4	289103	114530.2	444337.8	52814.4	14475.8
Horizontal Gas Well Emissions	12.26	3.28	25.1(8)	5.08	0.58	0.22
Percent Increase	0.016	0.002	0.04	0.002	0.002	0.004

(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
(8) Current EPA regulations require operators to reduce VOC emissions by 95 percent if their oil storage tanks emit over six tons of VOC emissions per year

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 of 1.25 tons/year should be considered a very gross estimate. Most of the VOC emissions estimated for one horizontal oil well result from venting from oil storage tanks. Current EPA regulations require operators to reduce VOC emissions by 95 percent if their oil storage tanks emit over 6 tons of VOC emissions per year. A reduction of 95 percent of oil storage tank VOC emissions would reduce the estimated HAP emissions to 0.12 tons/year.

Total Greenhouse Gases

The available statewide GHG summary combines GHG emissions from CO2 and CH4. To compare the GHG emissions from the Proposed Action estimated by the calculator with statewide GHG emissions, CO2e emissions for both CH4 and CO2 were summed. The total statewide GHG emission estimate for 2007 was 76,200,000 metric tons CO2e (76.2 million metric tons; (New Mexico Environment Department, 2010). The estimated CO2e metric tons emissions from one horizontal oil well (609.2 metric tons) would represent a 0.0008 percent increase in New Mexico CO2 emissions.

Cumulative Impacts

The FFO manages Federal hydrocarbon resources in San Juan, Sandoval, Rio Arriba, and McKinley counties. There are approximately 21,150 wells in the San Juan Basin. About 14,843 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 (BLM 2014).

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 (BLM 2014). 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 (BLM 2014) 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. Soil Resources

3.2.1. Affected Environment

Sedimentary rock and alluvial sediment primarily formed the oils in the San Juan Basin. The parent material of sedimentary rock consists mainly of shale bedrock and sandstone. These resistant sandstone and shale beds formed prominent buttes, mesas, and structural benches. The alluvial sediment was deposited on plateaus, mesas, ancient river terraces, and in river valleys. Mineralogy and particle size vary greatly in alluvial sediment.

The Natural Resources Conservation Service (NRCS) mapped the soils in the proposed project area. Complete soil information is available online at the NRCS's Web Soil Survey interactive website. Within the proposed project area, one soil map unit is present: Doak-Sheppard-Shiprock association, rolling (NRCS 2014).

The Doak-Sheppard-Shiprock association, rolling is composed of 40 percent Doak and similar soils, 30 percent Sheppard and similar soils, and 20 percent Shiprock and similar soils. This association is considered a well-drained soil, with the depth to water table and depth to restrictive layer being more than 80 inches. This soil is not prone to flooding or ponding. Doak-Sheppard-Shiprock is not considered prime farmland. The soil is subject to moderate water erosion and low wind erosion.

3.2.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Within the proposed well pad/construction zones, pipeline and access road corridor (Approx 13.17 acres total), vegetation would be cleared, topsoil would be stripped, and the location would be leveled or sloped. Approximately 2.91 acres would remain as bare, compacted surface for the life of the proposed project; the remainder 9.99 acres would be reseeded during interim reclamation (see Table 3. Extent of Surface Disturbance on BLM Lands**)**.

Soils in the proposed project area and staging area are classified as having a moderate water erosion potential and a low wind erosion potential (NRCS 2014). The clearing of vegetation within the proposed project area and staging area would result in the exposure of soils to water, wind, and direct human disturbances; erosion in these areas would potentially increase. Construction activities within the proposed Well/construction zone and access road corridor would result in the mixing, displacement, and compaction of soils. The degree of erosion would be dependent upon precipitation and wind. Following construction, the compaction of soils, reclamation of portions of the proposed project area, and implementation of erosion-control measures would limit soil impacts due to erosion.

Cumulative Impacts

The spatial analysis area for cumulative soil impacts is the proposed project area and immediately surrounding lands, and points immediately downstream. The proposed project areas for Wells 292H and 304H are within level to gently rolling terrain characterized by sagebrush shrub-lands intermixed with badlands and erosional drainages. The proposed project could contribute to ongoing soil erosion within and immediately downstream of the spatial analysis area, but these effects would be very minor.

Much of the proposed project area has already been disturbed and has since been reclaimed. Therefore, it is likely that there is little to no erosion currently associated with the project area and it is not anticipated that the use of this location would contribute substantially to erosion.

3.3. Upland Vegetation

3.3.1. Affected Environment

The proposed project area is located within the Arizona/New Mexico Plateau ecological region. This ecological region occurs primarily in Arizona, Colorado, and New Mexico; a small portion is located within Nevada. This ecological region encompasses approximately 45,870,500 acres (185,632 square kilometers), and the elevation ranges from 2,165 to 11,949 feet AMSL. The ecological region's landscapes include low mountains, hills, mesas, foothills, irregular plains, alkaline basins, some sand dunes, and wetlands. This ecological region 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 (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus depressus*), winterfat (*Krascheninnikovia lanata*), shadscale saltbush (*Atriplex confertifolia*), and greasewood (*Sarcobatus vermiculatus*); and grasslands of blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), and needle and thread grass (*Hesperostipa comata*).

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 (Griffith et al. 2006).

The general region surrounding the proposed project area is characterized by sagebrush shrublands with scattered pinyon pine (*Pinus edulis)* and one-seed juniper (*Juniperus monosperma*) along the rolling hills. The sagebrush shrublands are composed primarily of Wyoming big sage with lesser amounts of basin big sage and minor areas of black sage. Vegetation observed at the project areas is shown in Table 10.

Table 10. Vegetation Observed in the Project Area.

Common Name	Scientific Name
Claret cup	*Echinocereus triglochidiatus*
Big sagebrush	*Artemesia tridentate*
Fishhook cactus	*Sclerocactus brevihamatus*
Indian ricegrass	*Achnatherum hymenoides*
Blue grama	*Bouteloua gracilis*

Common Name	Scientific Name
Russian thistle	*Salsola kali*
Needle and thread grass	*Hesperostipa comata*
Squirrel tail	*Elymus elymoides*
Winterfat	*Krascheninnikovia lanata*
Rabbitbrush	*Chrysothamnus depressus*
Pinyon pine	*Pinus edulis*

3.3.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The proposed project would result in the removal of approximately 13.17 acres of sagebrush-shrubland vegetation within the two proposed Well/construction zones, existing road improvements, pipeline and new access road corridor.

During the construction phase of the proposed project, all vegetation within the proposed project area would be cleared. During interim reclamation, approximately 9.99 acres within the proposed project area and staging area would be reseeded. The remaining 2.91 acres of the proposed project area would remain as disturbed surface for the life of the proposed well.

During final reclamation, Logos would fully reclaim (re-contour and re-seed) all portions of the proposed project area, with the goal of restoring the character and productivity of the land.

During interim and final reclamation, the BLM Sagebrush-Grass Community Seed Mixture would be utilized; the species included in this mixture are listed in the Surface Reclamation Plan (Appendices C and D). Re-established vegetation would consist of native grass, forb, and shrub species included in the seed mixture, as well as native species that are not deliberately planted. It is also possible that invasive, non-native species could become established within the proposed project area; non-native invasive species could be transported by project equipment and tend to thrive in disturbed areas. Following the reclamation process, the resulting vegetation communities could differ from the native plant communities surrounding the proposed project area. Within reclaimed areas, it is not expected that the vegetation communities would return to native conditions within 20 years (BLM 2003b).

The deposition of fugitive dust generated during vegetation-clearing activities, during the use of the Well/construction zones, and during wind events could reduce photosynthesis and productivity of the surrounding vegetation (Thompson, et al. 1984; Hirano, et al. 1995), increase water loss in plants near the proposed project area (Eveling and Bataille 1984), and result in injury to leaves of surrounding vegetation.

Cumulative Impacts

The spatial analysis area (SAA) is the proposed project areas and immediately adjacent lands. Within the SAA, the following vegetative disturbances have occurred or are anticipated to occur in the reasonably foreseeable future:

- An existing gravel/dirt road is present at the start of the proposed access road.

- Active wildlife and livestock grazing occurs in the area. The proposed project area is within a BLM-FFO grazing allotment (Huerfano, # 5077) that is permitted for grazing 163 head of cattle year-round. The area also may be part of the Huerfano Community Allotment, #6007, permitted for 856 sheep year-round and managed by the Bureau of Indian Affairs (BIA).
- Indirectly, fugitive dust or deposition associated with existing roads and wells in the immediate area could impact the vegetation within the SAA, and could continue to do so throughout the life of the project.
- The proposed project would increase direct vegetation disturbance within the SAA and could potentially increase fugitive dust and/or deposition in the area.

Aside from those discussed, no additional impacts to vegetation are expected within the SAA for the reasonably foreseeable future.

3.4. Wildlife

3.4.1. Affected Environment

Migratory Birds

The bird species in Table 11 have a known distribution in the FFO area and may be affected by various types of project- related disturbance. These species and a brief assessment of their habitat are identified in Table 11.

Table 11. 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	Low shrub height, high vegetative cover, and proximity to riparian area likely excludes Bendire's thrasher from the action area; low potential
Black-throated sparrow (*Amphispiza bilineata*)	Xeric habitats dominated by open shrubs with areas of bare ground.	Dense understory cover of project area not typical of preferred habitat; low potential
Brewer's sparrow (*Spizella breweri*)	Closely associated with sagebrush, preferring dense stands broken up with grassy areas.	Lack of significant sagebrush cover likely limits potential; low potential
Gray vireo (*Vireo vicinior*)	In northern NM, stands of pinyon pine and Utah juniper 5800 - 7200 ft, open 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 pinyon-juniper cover in the analysis area limits suitable habitat for the species; low potential
Loggerhead shrike (*Lanius ludovicianus*)	Open country interspersed with improved pastures, grasslands, and hayfields. Nests in sagebrush areas, desert scrub, and woodland edges.	Desert scrub in the analysis area could provide suitable habitat for the species, although significant grassy areas are lacking; moderate potential
Mountain bluebird (*Sialia currucoides*)	Open piñon-juniper woodlands, mountain meadows, and sagebrush shrublands; requires larger trees and snags for cavity nesting.	Desert scrub in the analysis area could provide suitable habitat for the species; although nest habitat

Species Name	Habitat Associations	Potential to Occur in the Project Area
		lacking; moderate potential
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.	Desert scrub in the analysis area could provide suitable habitat for the species; moderate potential
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.	Low sagebrush cover in action area likely a limiting factor; low potential
Sage thrasher (*Oreoscoptes montanus*)	Shrub-steppe dominated by big sagebrush.	Low sagebrush cover in action area likely a limiting factor; low potential
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.	Desert scrub in the analysis area could provide suitable habitat for the species; moderate potential
Swainson's hawk (*Buteo swainsoni*)	A mixture of grassland, cropland, and shrub vegetation; nests on utility poles and in isolated trees in rangeland. Nest densities higher in agricultural areas.	Desert scrub in the analysis area could provide suitable habitat for the species; moderate potential
Vesper sparrow (*Pooecetes gramineus*)	Dry montane meadows, grasslands, prairie, and sagebrush steppe with grass component; nests on ground at base of grass clumps.	Desert scrub in the analysis area could provide suitable habitat for the species; moderate potential

General Wildlife

The project area is dominated by sagebrush shrubland. Wildlife species common to sagebrush-shrubland habitat include mule deer (*Odocoileus hemionus*), fox (*Vulpes* sp.), black-tailed jackrabbit (*Lepus californicus)*, desert cottontail (*Sylvilagus audubonii*), other small mammals, and reptiles (snakes and lizards).

A biological survey was completed on November 6th, 2014. Wells 292H and 304H were surveyed for wildlife and vegetation, including threatened and endangered species and noxious weeds. Evidence (tracks, scat, etc.) of kangaroo rats, bannertails, cottontails, jackrabbits, and coyote were observed in the project area. Several ravens were observed during the site visit; ne large stick nest potentially used by ravens was also observed approximately 1 mile outside the project area.

3.4.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

During the construction phase of the proposed project, all vegetation within the proposed project area, would be cleared. The proposed project would result in the removal of approximately 13.17 acres of sagebrush shrublands. The proposed project area would be converted to a reseed community following interim reclamation and final reclamation. The impacts to the vegetation communities are described in detail in Section 3.4 (Upland Vegetation).

There is available, similar habitat in the surrounding area that wildlife could utilize. However, the clearing of vegetation would remove potential habitat. The transformation of the proposed project area to a reseed community could remove potential habitat for numerous wildlife species.

For the short term, occasional human and vehicle presence within the vicinity of the proposed project area and staging area would increase above present levels. Additional well equipment could also cause increased noise levels in the vicinity. Noise and visual disturbances associated with the project could cause indirect habitat loss by deterring wildlife from using available habitat adjacent to the proposed project area. For the long term, minor, short periods of disturbance would occur during facility monitoring due to an average of 1 vehicle trip per week.

If interim and final reclamation are successful, sagebrush shrubland communities would become re-established within the proposed project area. However, as discussed in Section 3.4 (Upland Vegetation), the re-establishment of a mature, native plant communities could require decades (BLM 2003b).

Migratory Birds

Due to the mobility of adult birds, they would be unlikely to be directly harmed by the proposed project. As discussed in Section 2.1.2 (Description of Proposed Project - Protection of Flora and Fauna, Including Special Status Species and Livestock), if the vegetation-clearing phase of construction is scheduled to occur during migratory bird breeding season, a pre-construction migratory bird nest survey would be conducted within the proposed project area. However, no nests were observed in the project area during the site visit, and it is unlikely that nests, eggs, or young birds within the proposed project area would be directly harmed. If project activities occur during migratory bird breeding season, birds nesting outside of but near the proposed project area could abandon existing nests as a result of visual and noise disturbances.

The proposed project would result in increased activity, noise, and disturbed vegetation and could result in the decreased usage of the immediate area by some migratory bird species, while increasing usage by other species. Studies have shown mixed impacts of oil and gas development on nesting migratory birds. For example, there was no difference in overall nest density on plots with and without oil and gas compressors, according to a study by Ortega and Francis (2007). A study by Holmes and King (2006) found that the sage sparrow had lower nest survival in an area with ongoing gas development while the Brewer's sparrow had higher nest survival rates in a developed gas field when compared with populations in an undeveloped control area. While it is difficult to predict the effects of the project on migratory birds, some effects are expected.

General Wildlife

It is possible that burrowing animals could be killed or injured during the construction phase of the proposed project, as equipment digs into the earth and rolls over the surface of the ground.

As discussed in Section 2.1.2 (Description of Proposed Project – Protection of Flora and Fauna, Including Special Status Species and Livestock), wildlife hazards associated with the project would be fenced, covered, and/or contained in storage tanks, as necessary.

Cumulative Impacts

The SAA includes the proposed project area, and an approximately 1-mile radius around the proposed well locations. Within a 1-mile radius, there is existing and proposed disturbance, and the region has been fragmented. Existing and reasonably foreseeable future disturbances within an approximate 1-mile radius of the proposed wells include the following:

- 8 active oil or gas wells
- 12 plugged oil and gas wells
- 2 permitted water wells
- 10.3 miles of BLM Roads
- 3.8 miles of County Road 7675, State Highway 57 and US Highway 550
- Several utility ROWs
- Livestock grazing

Habitat disturbance and fragmentation in the area is primarily the result of oil and gas development (including well pad, access roads, and pipeline corridors). The direct and indirect habitat disturbance, fragmentation, and human activities associated with these disturbances could deter wildlife from utilizing portions of the analysis area. The proposed action would contribute to direct and indirect habitat disturbance and fragmentation in the analysis area.

3.5. Special Status Species

3.5.1. Affected Environment

The BLM manages certain species which are 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. BLM Special Status Species (SSS) include BLM Sensitive Species and BLM-FFO Special Management Species (SMS).

New Mexico BLM State Directors have developed a list of BLM Sensitive Species for the State of New Mexico (BLM 2011c, BLM 2011d, BLM 2011e, BLM 2012). In accordance with BLM Manual 6840, the BLM-FFO has prepared a list of BLM-FFO SMS to focus species management efforts toward maintaining habitats under a multiple-use mandate (BLM 2008b, BLM 2008c). BLM-FFO SMS include some BLM Sensitive Species and other species for which the BLM-FFO has determined special management is appropriate (BLM 2008c). The authority for this policy and guidance is established by the ESA; Title II of the Sikes Act, as amended (16 USC 670a-670o, 74 Stat. 1052); FLPMA; and Department of Interior Manual 235.1.1A.

Table 12 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 proposed action, 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 12. 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		

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 surrounding action area contains suitable habitat for foraging, but not nesting.
Ferruginous hawk *(Buteo regalis)*	SMS		Grasslands and semi-desert shrub; occasionally pinyon-juniper edge habitat. Nest on rock spires in NW New Mexico.	Proposed action area contains suitable pinyon-juniper edge habitat for foraging.
Prairie falcon *(Falco mexicanus)*	SMS		Arid, open country, grasslands or desert scrub, rangeland; nests on cliff ledges, trees, power structures.	The surrounding action area contains suitable habitat for foraging.
Mountain plover *(Charadrius montanus)*	SMS		Semi desert,grasslands, open arid areas, bare fields, breeds in open plains or prairie.	Proposed action area does not contain flat, open grasslands for suitable habitat.
Western 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 riparian areas suitable for 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 surrounding action area contains limited 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	Proposed action area does not contain suitable habitat for nesting, foraging opportunities unlikely.
Western 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 and nesting. No associated prairie dog colonies occur in the action area.

Species Name	Conservation Status		Habitat Associations	Potential to Occur in Analysis Area
	FFO	State of New Mexico		
Mammals				
Spotted bat (*Euderma maculatum*)	SMS		Meadows in subalpine coniferous forests are the preferred habitats for this species; rocky cliffs are important for roosting. Also recorded in a wide variety of habitats, from riparian and piñon-juniper woodlands to ponderosa pine and spruce-fir forests.	Suitable foraging habitat occurs within the project and action areas.
Townsends big-eared bat (*Corynorhinus townsendii*)	SMS		Federal Species of Concern Roosts mostly in caves or mines; at night can roost in abandoned buildings. In summer, this species occurs widely across the state and can be found over desert-scrub, desert-mountains, oak-woodland, piñon-juniper, and coniferous forests.	Suitable foraging habitat occurs within the project and action areas.
Plants				
Brack's hardwall cactus (*Sclerocactus cloveriae* ssp. *brackii*)	SMS	NM-E	Sandy clay slopes of the Nacimiento Formation in sparse semi desert, piñon-juniper grasslands and open arid areas of badland habitat (5,000 to 6,000 ft).	Nacimiento formation; no species were observed during the site visit.
Aztec gilia (*Aliciella formosa*)	SMS	NM-E	Arid and sparsely vegetated Badland /Salt desert scrub communities in soils of the Nacimiento Formation (5,000 to 6,000 ft).	Nacimiento formation; no species were observed during the site visit.

The proposed action area provides potential foraging habitat for American peregrine falcon, prairie falcon, golden eagle, and to a lesser degree ferruginous hawk. The proposed project and action area were visually scanned for raptors, raptor nests, and whitewash. One unknown stick nest was observed near, but outside the proposed project areas. Ravens, but no other raptors or their sign were observed during the on-site field survey.

The project area does not contain suitable habitat for mountain plover, yellow-billed cuckoo, burrowing owl, or bald eagle.

The proposed action area is within the BLM/FFO designated potential habitat area for Brack's hardwall cactus (*Sclerocactus cloveriae* var. *brackii*) and Aztec gilia *(Aliciella formosa*).

No Aztec gilia or Brack's hardwall cactus were observed in the project area, although both species were observed approximately 1.5 miles south the project area.

3.5.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Aztec gilia and Brack's hardwall cactus

No Aztec gilia or Brack's hardwall cacti were detected during surveys. Surveys for the species were conducted simultaneously and in coordination and compliance with BLM FFO guidance. Potential habitat for the two species is poor to marginal in nature and limited to one north-facing slope located approximately 50 meters south of the proposed Well Pad 304H boundary. Because no gilia or cacti were detected during the surveys, there would be no direct or indirect effects to either plant species.

American Peregrine Falcon, Ferruginous Hawk, Prairie Falcon, and Golden Eagle

The proposed Project Area does not support nesting habitat for any BLM Special Status Species (SSS) raptors. The Project Area vicinity contains several scattered pinion and juniper trees located between an existing well pad and Highway 550. Because of the existing lack of suitable habitat, site conditions, and disturbance levels, short-term construction-related impacts including noise and visual disturbances associated with proposed project activities would not likely affect raptor nesting habitat or raptor nesting habitat potential.

The Project Area may potentially support foraging habitat for golden eagles, burrowing owls, and prairie falcons. Short-term construction-related disturbances may temporarily discourage raptor use of the sagebrush habitat for foraging purposes within or immediately adjacent to the Project Area. However, raptors would likely resume foraging behavior within and adjacent to the Project Area once construction-related activities are complete.

There is similar habitat available in the surrounding area that BLM SSS raptors could utilize for foraging. However, the proposed project would result in the total disturbance of 13.17 acres of potential foraging habitat for these species. Of this, 2.91 acres would remain active and un-vegetated throughout the lifetime of the proposed project. The remaining acreage would be reclaimed (reseeded only or recontoured and reseeded) during interim reclamation; these reclaimed areas could be used by raptors for foraging. If interim and final reclamation are successful, sagebrush shrub-land vegetation community would become re-established within the proposed project area. However, as discussed in Section 3.4 (Upland Vegetation), the re-establishment of a mature, native plant community could require decades, and it is possible that the plant community could never fully recover from disturbance (BLM 2003b). Additionally, sound and visual disturbances associated with the proposed project could cause indirect habitat loss by deterring BLM Special Status Species raptors from foraging adjacent to the proposed project area. Habitat loss and fragmentation likely reduce the carrying capacity for wildlife, although the exact level of reduction cannot be quantified (BLM 2003b).

As discussed in Section 2.1.2 (Description of Proposed Project – Protection of Flora and Fauna, including Special Status Species and Livestock), if construction activities would occur during the migratory bird breeding season, a pre-construction migratory bird nest survey would be conducted within the proposed project area. Therefore, it is unlikely that nests, eggs, or young BLM Special Status Species raptors would be directly or indirectly harmed by the proposed project.

Cumulative Impacts

The proposed action would have a negligible impact on Special Status Species. There were no observations of Special Status Species, and very limited potential foraging habitat of several raptor species. Cumulative impacts would be negligible.

3.6. Cultural Resources

3.6.1. 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 BLM-FFO Final Environmental Impact Statement (2003) and will not be reiterated here. Additional information can also be found in an associated Cultural Resources Technical Report (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 (TCP's; 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.

The entire Area of Potential Effect (APE) for the Proposed Action was archaeologically surveyed by *ERO Resources* at a BLM Class III level (100 percent) and a report was 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)). For the Proposed Action, identification of TCP's 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 Class III inventory identified one previously documented historic property within the APE (Croll et al. 2014; BLM Report No. FY 2015 (II) 017F). The site extends across the existing 292H well access road that is proposed for gravel upgrade. The historic property will be avoided during road access upgrades by installing temporary fencing along the edges of the road and by monitoring project related activities that occur within the site boundaries. No TCP's are known to exist in the APE.

3.6.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Cultural resources tend to degrade over time from natural forces; however, many survive for hundreds or thousands of years. Any land-disturbing activity can disturb, damage, or uncover

cultural resources. Direct impacts normally include alterations to the physical integrity of a historic property. If a historic property is significant for other than its information potential, direct impacts may also include the introduction of audible, atmospheric, or visual elements that are out of character for the property. A potential indirect impact from the proposed action, particularly in undeveloped areas is the increase in human activity or access to the area with an increased potential of unauthorized damage to historic properties.

Historic properties are being avoided with the implementation of design features such as but not limited to reduction of construction areas, temporary barriers, and site monitoring. These design features are detailed in the Cultural Resource Record of Review, attached to the COA in the APD/ROW as the case may be. The proposed action is not known to physically threaten any TCP's, 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 impact on historic properties (no historic properties affected).

Cumulative Impacts

There will be no negative cumulative impact on known historic properties as they are being avoided by relocating the surface disturbing components of the proposed action away from the property. A positive cumulative effect is the additional scientific information yielded by the archaeological survey.

3.7. Grazing

3.7.1. Affected Environment

Two grazing allotments are coincident with the proposed well projects. Well 304H and access road, as well as the access road to Well 292H, is located in the Huerfano Community Allotment, number 06007. Well 292H is located just inside another grazing allotment, the Huerfano Allotment, number 05077. Both allotments consist of 100 percent BLM-authorized Animal Unit Months (AUMs) managed out of the BLM-FFO. Average rangeland carrying capacity is measured in terms of acres per AUMs, or the amount of acres needed to provide 1000lb of forage, which is enough to sustain a cow or a cow/calf pair for one month.

The Huerfano Community allotment has a grazing authorization that permits 856 sheep over a grazing period from March 1 to February 28, annually. The Huerfano Community allotment permits the utilization of 2,055 active AUMs of forage to the Navajo Nation on 16,461 acres, with an average rangeland capacity of 8.01 acres. The Huerfano Allotment has a grazing authorization that permits 163 cattle over a grazing period from March 1 to February 28, annually. The Huerfano allotment has a grazing authorization that permits 1,404 AUMs on 10,675 acres, for an average rangeland capacity of 7.6 acres per AUM.

There is an existing fence between the two allotments. The fence (cattle guard) crosses the existing access road to the proposed Well 292H. Otherwise, the analysis area contains no known range improvements.

3.7.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The Brannon Federal 304H well, access road, and pipeline are proposed to be constructed on the Huerfano Community Allotment number 6007. The access road to Brannon Federal 292H well is also on the Huerfano Community Allotment. All together, the associated disturbance for construction of the wells, access roads and pipeline would be 9.03 acres. The estimated short-term impact to range carrying capacity would be a loss of 1.13 AUMs (9.03 acres/8.01 acres/AUM). After successful reclamation of the pipeline and construction areas, the long term-loss of AUMs would be 0.25 AUMs (2.02 acres not reseeded /8.01 acres/AUM).

The Brannon Federal 292H well (5.74 acres) is proposed to be constructed on the Huerfano Allotment number 05077. The estimated short-term impact to range carrying capacity would be a loss of 0.755 AUMs (5.74 acres/7.6 acres/AUM). After successful reclamation of the construction zone and re-seed working area on the pad surface, the long term-loss of AUMs would be 0.17 AUMs (1.76 acres not reseeded /7.6 acres/AUM).

Additional short term impacts may include displacement of permitted livestock during construction activities or exposure of livestock to hazards. Livestock likely have acclimated to existing oil and gas operations in the area, including vehicle traffic. Vehicle traffic associated with this well could pose impacts to livestock considering that the area is open range, although dirt/gravel roads require slow vehicle speeds.

Cumulative Impacts

The proposed project would impact livestock grazing within the analysis area, defined as a 1-mile radius around the two proposed Wells. As described in section 3.5 (Wildlife) there is existing disturbance and the region has been fragmented, primarily due to oil and gas development and the associated Wells, access roads, and pipeline corridor. The analysis area contains disturbance from a total of 20 wells drilled (8 active, 12 that have been plugged). The addition of two wells would contribute to the overall long-term loss of grazing forage in the area.

3.8. Visual Resources

3.8.1. Affected Environment

The BLM classifies visual resources through a Visual Resource Inventory (VRI). The VRI has three components: scenic quality, sensitivity, and distance zone. Scenic quality is a measure of the visual appeal of a tract of land. In the VRI process, BLM-managed lands are given an A, B, or C rating based on the apparent scenic quality. Scenic quality is determined by using seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modification. Areas with the most visual appeal are rated A, while areas with the least visual appeal are rated C. The project area is within the Blanco Wash area (SQRU 023), an area rated B for scenic quality. The area contains a long, sinuous wash surrounded by low hills and benches. Mostly low, rolling, gentle slopes lead to the prominent mesas on the east, open sagebrush country on the southwest, and Harris Mesa on the west. Vegetation is low and continuous. Colors vary from the beiges of the soils to the greens of the vegetation.

The distance zone analysis is conducted to determine the relative visibility from travel points or observation points. The distance zone for this area is foreground/middle-ground meaning the area can be seen from travel routes of observation points within a distance of 3 to 5 miles.

Visual resources are managed by assigning a Visual Resource Management (VRM) Class. The objective for each VRM Class describes how that area should be managed. The project area is within a VRM Class IV. The objective of this class is to provide for activities that require major modification of the landscape. The level of change to the landscape can be high, and management activities may dominate the view and be the major focus of attention.

3.8.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The proposed project would involve the short-term mobilization of equipment and infrastructure to the project area, and situated on two sites during drilling and completion operations. During the construction phase (7 to 14 days), vehicles and heavy equipment would be on-site throughout the project area. Upon commencement of drilling operations, a drill rig would be mobilized to each site. The drill site would be lit up during drilling operations, affecting the overall visual quality of the area during times of darkness over the 60-day construction phase. The most pronounced visual impacts would be short-term in nature. Permanent production facilities would be painted Carlsbad Brown to blend with the beige of surrounding sediments.

Cumulative Impacts

Cumulative impacts to visual resources in the area associated with oil and gas development are disclosed in the BLM EIS/Resource Management Plan, and are managed by the BLM through the Visual Resource Inventory process and related management and monitoring actions. Impacts to visual resources as a result of the proposed project are in keeping within the management objective of Class IV, which allows for major modifications to the landscape. Cumulative impacts associated with the proposed project are expected to be minor.

3.9. Noxious Weeds and Invasive Species

3.9.1. ***Affected Environment***

Vegetation within the project area is described in Upland Vegetation, Section 3.3.. Common weeds of concern in the general area include Russian knapweed (*Acroptilon repens*), musk thistle (*Carduus nutans*), halogeton (*Halogeton glomeratus*), and salt cedar (*Tamarix sp.).* No weeds were observed during the on-site visit on November 5 and 6, 2014.

3.9.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

No noxious weeds were observed in the project area. However, ground disturbing activities increase the risks of weed invasions. Personal vehicles could translocate weeds to newly exposed bare ground surfaces. Exposing bare ground surfaces allows the establishment and growth of weed species. Dust deposition due to project activity reduces vigor and reproduction of native plants, and impacts pollinator species. All these factors increase the chance of weed infiltration in the project areas.

The potential for weed invasions will be mitigated by implementation of the Bare Soil Procedures and best management practices (BMPs) set forth in the Gold Book by the BLM (BLM 2007) and in the Surface Use Plan of Operations (Appendices C and D).

Cumulative Impacts

Based on the increased surface disturbance, the introduction or spread of non-native invasive species could occur if future activities (recreation, oil and gas development, grazing) were to overlap with the project area. With revegetation and the implementation of restoration BMPs for the Proposed Action and assumed BMPs for future activities, cumulative impacts from invasive species should be minor.

3.10. Environmental Justice

3.10.1. Affected Environment

Federal agencies must identify and address disproportionately high and adverse human health or environmental effects of programs, policies and activities on minority or low-income populations (defined as those living below the poverty level), according to Executive Order 12898. As a percent of total population, New Mexico has the highest portion of Hispanics in the country (Census Bureau, 2012a), comprising 46.5 percent of the state's population. By contrast, non-Hispanic minorities comprise 48 percent of the population of San Juan County.

Table 13. Minority and Low Income Populations in New Mexico and San Juan County.

	Minority Populations[1]						Low Income Populations[2]	
Area	**African American**	**American Indian/AK native**	**Asian & Pacific Islander**	**Some Other Race**	**Two or More Races**	**Hispanic[3]**	**Households in Poverty**	**Median Household Income**
New Mexico	2.1%	9.4%	1.5%	15%	3.7%	46.5%	19.0%	$44,631
San Juan County	0.6%	36.6%	0.4%	7.3%	3.5%	19.1%	19.7%	$49,024

[1]Source: Census Bureau, 2011
[2]Source: Census Bureau, 2012b.
[3]Hispanic origin is considered an ethnicity, not a race. Hispanics may be of any race.

Compared to the statewide average, Hispanics make up a lower contribution to the total population (19.1 percent for San Juan, compared to 45.5 percent for the state of New Mexico). American Indians account for the majority of minority population in San Juan County. Total minority populations for San Juan (67.5 percent) are below the state of New Mexico (78.2 percent). Low-income populations are comparable, at 19.7 percent for San Juan County and 19.0 percent for the state of New Mexico.

3.10.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Both well sites 304H and 292H are within close proximity (200 meters or less) to small sections of Indian/Tribal land (Figure 1). However, there are no homes present and impacts to native

populations from releases to air, dust, visibility or noise, are not expected. Minor temporary effects to grazing allotments held by tribal groups may occur.

The proposed action would provide a short-term stimulus to the economic activity and a longer-term fiscal stimulus to the County, and is not expected to result in disproportionately high and adverse human health or environmental impacts to minority populations or low-income populations.

Cumulative Impacts

Ongoing development for oil and gas in San Juan County would have an additive effect and are anticipated to provide long-term economic stimulus to the County and region.

3.11. Public Health and Safety

3.11.1. Affected Environment

The project area within a sparsely populated, rural area. Blanco Trading Post (12341 Hwy 550) and a nearby residence are within 1 mile of well 304H; otherwise, there are no buildings or residences within a 1 miles radius of the wells. The nearest town is Nageezi with a population of 286 according to the 2010 census (Census Bureau, 2010), approximately 6 miles south of the project area. Nageezi does not offer visitor amenities. Temporary workers during the construction, drilling or reclamation phases of the project would likely stay in Broomfield, 33 miles north of the project site (population 6,146).

During the years 1998 to 2008, total crime in San Juan County increased from 1,800 to 3,400 (Recordspedia, 2009), representing an increase of 47 percent. Over that same time frame, violent crime increased by 34 percent. The crime rate per thousand people for Bloomfield is relatively high compared to other similar cities in New Mexico (3rd highest out of 10 similar cities) (Recordspedia, 2009). However, the crime rate for Bloomfield is down overall. Between the years of 2001 to 2008 crime data were available in Bloomfield, New Mexico. During that time frame, reported crime in Bloomfield has decreased by 40 percent. During the same interval, violent crime decreased by 45 percent. On the whole, the crime figures reflect a slight reduction in crime over the last 7 years in Bloomfield (Recordspedia, 2009).

Traffic statistics obtained from San Juan County (San Juan County, 2015) indicate that the accident rate along US 550 has been fairly stable over the past five years, although five fatalities did occur in 2014.

Table 14. San Juan County Sheriff's Office, Traffic Crashes on US 550 South of Broomfield.

Reported Crashes on US 550 South of Broomfield	2010	2011	2012	2013	2014	Five Year TOTALS
Total Number of Crashes	34	31	32	24	29	150
Fatal Crashes	0	2	2	3	2	9
Fatalities	0	3	2	3	5	13
Injury Accidents	7	10	10	11	7	45

Source: San Juan County Sheriff's Office 2015.

Air quality may effect health and safety. Air quality for San Juan County and for the State of New Mexico is described earlier in section 3.1.

3.11.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Traffic along US 550 would be most heavy during the construction phase (a duration of 7 to 15 days), as well as during interim reclamation approximately 120 days after the start of the project (for a duration of 7 to 15 days). Approximately 5 to 40 vehicle trips would be needed during the project duration (about 4 to 5 months total). Construction crews are required to comply with all traffic laws; however, additional traffic could increase the risk of traffic accidents. Additional personnel residing in the project area could contribute to crime. About 10 to 40 construction personnel would be onsite during the project, depending on the stage of project completion. Personnel likely would find lodging and other requirements (fuel, food, etc.) in Bloomfield, New Mexico, about 33 miles north of the project area. The potential for increased crime, particularly given trends in the Bloomfield crime statistics, are speculative.

Changes to air quality from the proposed action are expected to be relatively minor, as discussed in Section 3.1. It is unclear whether these air pollutants would affect the health of nearby residents or workers closest to the well. Workers in closest proximity to the drilling activity use engineering controls and protective gear to minimize risk of effects.

Cumulative Impacts

None would be expected due to the relatively small scale and short duration of the project, as well as local traffic and crime trends.

4. SUPPORTING INFORMATION

4.1. Tribes, Individuals, Organizations, or Agencies Consulted

Table 15 contains a list of tribes, individuals, organizations, and agencies invited to attend the on-site for the project.

Table 15. Tribes, Individuals, Organizations, and Agencies Invited to the On-Site

Name	Tribe, Organization, or Agency	Attended On-Site
N/A	Huerfano Chapter House	No
Melinda A Ciarco	Navajo Historic Preservation	No
Tweetie Blancett		No
Bruce Baizel	Earthworks Action	No
Gary Graham	Western Resources	No
Lori Goodman	kiyaani	No
Samuel Sage		No
Mike Eisenfeld	San Juan Citizens	No
Don Schrieber	Vivarioarriba	No
Pete Dronkers	Earthworks	

The BLM fulfills its responsibilities under the National Historic Preservation Act (NHPA) through a number of agreements. The National Programmatic Agreement (NPA; 2012) between the BLM, Advisory Council on Historic Preservation (ACHP), and the National Council of State Historic Preservation Officers (NCSHPO) allows the agency to fulfill its NHPA responsibilities according to the provisions of the NPA in lieu of 36 CFR 800.3 through 800.7 regulations. The NPA, which applies to all BLM activities below specified thresholds, provides among other things, regulatory relief in many instances from the requirement for case-by-case review by State Historic Preservation Officers (SHPOs) and the ACHP, in exchange for managers' maintenance of appropriate staff capability and observance of internal BLM standards as set out in the 8100 Manual series.

The New Mexico BLM has a two-party protocol with the New Mexico SHPO (2014) specifically encouraged by the NPA. This protocol details how the New Mexico BLM and SHPO will regulate their relationship and consult. Specifically, this document outlines among other things, how and when consultation will be conducted between the BLM, SHPO, Tribes, and the public. The protocol also outlines when case-by-case SHPO consultation is or is not required for specific undertakings and the procedures for evaluating the effects of common types of undertakings and resolving adverse effects to historic properties. These common types of undertakings regularly include the common actions undertaken in the BLM FFO.

BLM will provide list of Tribes

- Huerfano Chapter of the Navajo Nation

4.2. List of Preparers

Mike Flaniken (BLM) – Environmental Protection Specialist Team Lead

Roger Herrera (BLM) – Environmental Protection Specialist (on-site lead)

Geoffrey Haymes (BLM – Archaeologist

James Copeland (BLM) – Archaeologist

Esther Willeto (BLM) – Tribal Liaison

Amanda Nissula (BLM) – Planning and Environmental Specialist

John Kendall (BLM) - Biologist

Cassandra Shenk (ERO) – NEPA Specialist

Aleta Powers (ERO) – NEPA Specialist

Sean Larmore (ERO) –Archaeologist/Project Manager

Adam Petry (ERO) – Natural Resource Specialist

Jenn McLeland (ERO) – Technical Editor

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APPENDIX A. FIGURES

APPENDIX B. DETAILED PLAN SHEETS

APPENDIX C. SURFACE USE PLAN OF OPERATIONS AND SURFACE RECLAMATION PLAN FOR WELL 292H

APPENDIX D. SURFACE USE PLAN OF OPERATIONS AND SURFACE RECLAMATION PLAN FOR WELL 304