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WPX Energy Production, LLC's
Chaco 2306-16L #209/#210H/#271H

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1. PURPOSE AND NEED FOR ACTION

1.1. Background

WPX Energy Production, LLC (WPX) has submitted three Applications for Permit to Drill (APDs) to the Bureau of Land Management – Farmington Field Office (BLM-FFO) for the Chaco 2306-16L Nos. 209H, 210H, and 271H (209H/210H/271H) project (Project). The proposed action is the approval of the APDs by the BLM-FFO, located in Farmington, New Mexico.

The proposed Project is located on State Land Office (SLO) lands managed by the SLO within Section 16 of Township 23 North, Range 06 West, N.M.P.M. and will develop federal minerals from the Counselors Gallup-Dakota Pool associated with valid existing lease USA NMSF078359. The Project would include use and subsequent reclamation of one existing multi-well well pad. Three natural gas and oil wells would be horizontally drilled, possibly produced and eventually plugged and abandoned from the aforementioned well pad.

The proposed 209H, 210H, and 271H wells would each be authorized by an approved APD. The existing well pad, access road, pipeline ties and two wells (Chaco 2306-16L #243H & #244H) were previously authorized by an APD (C-101) with the State of New Mexico Energy Minerals and Natural Resources Oil Conservation Division for the Chaco 2306-16L #244H.

The Project would result in no new surface disturbance. Drilling of the three wells would occur on an existing 606 feet by 400 feet (5.56 Acres) well pad. Of this existing surface disturbance, 1.17 acres would be reseeded (but not recontoured) during interim reclamation and 3.15 acres would be fully reclaimed during interim reclamation. The remainder (1.24 acres) would remain disturbed throughout the life of the project, and would be fully reclaimed during final reclamation.

The three wells are being placed entirely on existing disturbance. As such, no additional action alternatives were identified for the 209H/210H/271H project.

Oil and natural gas, vital components of the nation's energy supply, account for approximately 36 and 25 percent of total energy consumed in the U.S., respectively. These energy sources are used in residential and commercial buildings, in transportation, and by industry (U.S. Energy Information Administration 2012). Common uses for natural gas include space heating, water heating, cooling, cooking, waste treatment and incineration, metals preheating, drying and humidification, glass melting, food processing, fueling industrial boilers, vehicle fueling, and electricity generation. Gases such as butane, ethane, and propane can be extracted from natural gas to be used for products such as fertilizers and pharmaceuticals. Natural gas can also be used to create methanol, which is utilized in the production of formaldehyde, acetic acid, fuel cell sources, and additives for cleaner burning gasoline (Natural Gas Supply Association 2010). Most oil goes into fuels, including gasoline, jet fuel, and home-heating oil. Additionally, non-fuel compounds extracted from oil are used to develop lubricants; asphalt for roads; tar for roofing; waxes for food wrapping; solvents for paints; cosmetics and dry-cleaning products; plastics; and foams (U.S. Energy Information Administration 2012).

Approximately 84 percent of natural gas and 55 percent of oil consumed in the U.S. is produced in the U.S. Additionally, U.S.-produced natural gas and oil are also exported to other countries (U.S. Department of Energy 2011). Within the U.S., oil and natural gas reserves are concentrated within distinct fields. The BLM-FFO management area is within the San Juan Basin, one of the most prolific gas-producing basins in the country. Currently, the San Juan Basin produces small amounts of oil (BLM 2003a, 3-9).

Taxes and royalties on oil, natural gas, and carbon dioxide production contribute approximately 25 percent of New Mexico's general fund, and the oil and gas industry is one of the largest private sector employers in the state (New Mexico Bureau of Geology and Mineral Resources 2012). Additionally, the federal government receives royalties, or a share of the production income, for extracted federal minerals.

In 2011, federal natural gas royalties totaled over 2 billion dollars (Office of Natural Resources Revenue 2012).

The Project area would be within the BLM-FFO management area of Rio Arriba County, New Mexico. It is located approximately 55 miles south-southeast of the town of Bloomfield, New Mexico; 18 miles east-southeast of the community of Nageezi; 0.14 mile north of U.S. Highway 550; and 1.30 miles west of County Road 379 (Appendix A).

1.2. Purpose and Need for Action

The purpose of the following proposed action is to allow WPX access to BLM managed lands to develop their mineral leases administered by the BLM.

The need for the proposed action is established by the BLM's responsibility under the Mineral Leasing Act of 1920 (MLA, as amended (30 U.S. Code [USC] 181 et seq.), to respond to a request for an Application for Permit to Drill (APD). The MLA authorizes the BLM to issue oil and gas leases on public lands for the exploration of mineral deposits (including oil, gas, and other hydrocarbons) and permit the development of those leases. It is the policy of the BLM to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs. The existing lease is a binding legal contract that allows development of the mineral estates by WPX. Approval of the APDs issued by the BLM authorizes the applicant to drill the proposed wells.

1.3. Decision to be Made

The BLM-FFO will decide whether or not to issue the three APDs associated with the proposed project, and if so, under what terms and conditions. The BLM is mandated under the National Environmental Policy Act of 1969, as amended [42 U.S.C. §4321] which requires that environmental obligations are conducted in a manner that protects the mineral resources, other natural resources, and environmental quality. The authorized officer shall prepare an environmental record of reviews (e.g. Documentation of NEPA Adequacy [DNA]) or an environmental assessment as appropriate per [42 U.S.C. §3162.5-1(a)]. The BLM-FFO must determine based on this environmental record of reviews if there are any significant environmental impacts associated with the proposed actions, warranting further analysis in an Environmental Impact Statement (EIS).The BLM-FFO Field Manager is the authorized officer who will decide one of the following:

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

1.4. Conformance with Applicable Land Use Plan(s)

The proposed action is in conformance with the 2003 BLM-FFO Resource Management Plan (RMP). Pursuant to 40 CFR 1508.28 and 1502.21, this site-specific EA tiers into and incorporates by reference the information and analysis contained in the BLM-FFO Proposed Resource Management Plan/Final Environmental Impact Statement (PRMP/FEIS; BLM 2003a). The RMP was approved by the September 29, 2003 Record of Decision (ROD; BLM 2003b), and updated in December 2003.

Specifically, the proposed action is in conformance with the following objectives:

> 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 2003b, 2-2 – 2-3)

This EA addresses site-specific resources and effects of the proposed action that were not specifically covered within the PRMP/FEIS as required by NEPA. The proposed project would not be in conflict with any local, county, or state plans.

1.5. Relationship to Statutes, Regulations or Other Plans

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

Many 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

Activities affecting Waters of the U.S. are regulated under the Clean Water Act (CWA) (33 USC 1251-1376; Chapter 758; PL 845; 62 Stat. 1155); reauthorized 1991). Specifically, Section 404 authorizes discharges to waters of the U.S. and Section 401 provides water quality certification for such activities. The Section 401 certification would be granted by the New Mexico Environment Department (NMED).

The Nationwide Permit (NWP) program under Section 404 of the Act provides for fills to waters subject to jurisdiction under Section 404 for certain discharges. It is administered by the EPA and U.S. Army Corps of Engineers (USACE). Under the CWA, the USACE has jurisdiction over waters of the U.S. Waters of the U.S. are considered jurisdictional because they have a “significant nexus” to traditional navigable waters. The BLM-FFO and USACE - Durango Regulatory Office have determined that jurisdictional waters (i.e., waters of the U.S.) within the BLM-FFO planning area may include U.S. Geological Survey (USGS) watercourses (i.e., “blue lines” on USGS 1:24,000 topographic maps) and potentially tributaries to these USGS watercourses.

Under Section 402 of the Act, as amended, the U.S. Environmental Protection Agency (EPA) regulates storm water discharges from industrial and construction activities under the National Pollution Discharge Elimination System program (NPDES). 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. However, oil and gas activities have been exempt from NPDES permitting regulations in New Mexico.

The proposed wells will be drilled from an existing well pad and will not result in new disturbance to any jurisdictional waterways.

1.5.2 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). The NMED issues construction and operating permits for air quality and enforces air quality regulations and permit conditions.

1.5.3 Endangered Species Act

The Endangered Species Act of 1973 (ESA) [16 U.S.C. 1531 et. seq.] requires all federal departments and agencies to conserve species listed as threatened or endangered, and species listed as candidates for federal listing with the United States Fish and Wildlife Service (USFWS), or designated habitat. Under Section 7 of the Endangered ESA, all federal agencies are required to consult with the USFWS or

National Marine Fisheries Service on all actions authorized, funded, or carried out by a federal agency that may affect listed species or designated critical habitat.

Consultation with the USFWS was conducted as part of the PRMP/FEIS to address the cumulative effects of RMP implementation (Consultation No. 2-22-01-I-389, Appendix M of the PRMP/FEIS).

1.5.4 Archaeological Resources

Section 106 of the National Historic Preservation Act of 1966 (NHPA), Section 3 of the Native American Graves Protection and Repatriation Act (NGPRA), and the Archaeological Resources Protection Act (ARPA) provide for protection of historical resources, including cultural and religious properties. NHPA provides protection for sites eligible for listing in the National Register of historic places through federal agency oversight, independent of land ownership when construction, operation, and reclamation of the infrastructure is located on non-Federal land that does constitute a Federal action. NGPRA provides ownership disposition of Native American resources intentionally excavated or inadvertently discovered on Federal or tribal lands. ARPA provides protection of Native American cultural and religious resources on Federal and tribal lands, in the event they are discovered.

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 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 (1997).

1.5.5 Wastes, Hazardous or Solid

The Resource Conservation and Recovery Act [(42 U.S.C.) § 6926, et. seq.] (RCRA) provides Federal authority to control hazardous wastes, including the generation, transportation, treatment, storage, and disposal of hazardous waste. It also sets forth a framework for the management of non-hazardous wastes and control of underground storage of petroleum or other hazardous materials and provides authority for state hazardous waste programs under §3006 of the Act. A 1980, amendment to RCRA conditionally exempted from regulation as hazardous wastes, “drilling fluids, production waters, and other wastes associated with the exploration, development, or production of crude oil or natural gas. On July 6, 1988, EPA determined that oil and gas exploration, development and production (ED&P) wastes would not be regulated as hazardous wastes under RCRA. A simple rule of thumb was developed for determining if an ED&P waste is likely to be considered exempt or non-exempt from RCRA regulations: If (1) the waste came from down-hole, or (2) the waste was generated by contact with the oil and gas production stream during removal of produced water or other contaminants, the waste is most likely to be considered exempt by EPA.

The Comprehensive Environmental Response Compensation and Liability Act [(42 U.S.C.) §9601, et seq.] (CERCLA) provides Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment and provides for liability of persons responsible for releases of hazardous waste. Despite many oil and gas constituent wastes being exempt from hazardous waste regulations, certain RCRA exempt contaminants could be subject to regulations as hazardous substances under CERCLA. The New Mexico the Oil Conservation Division (OCD) administers hazardous waste regulations for oil and gas activities in New Mexico.

All wastes would be disposed of in a proper manner as required by federal and state law, and as described in the Conditions of Approval (COAs). No hazardous or solid waste materials are present within the analysis area. The notification of releases such as natural gas, natural gas liquids, and petroleum, outside a facility site is required under CERCLA and under BLM NTL-3A.

1.5.6 Public Health and Safety

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

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

1.5.7 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. Oil and gas regulations administered by NMOCD are contained in NMAC 19.15. These regulations include the following, with which WPX 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.

1.6. 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 was held at the proposed project location on July 17, 2014. Attendees at the on-site meeting included WPX, BLM-FFO representatives, and an environmental consultant (EIS, LLC.). 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. A BLM-FFO Interdisciplinary Team meeting was held on July 28, 2014, to discuss the proposed action. At the aforementioned meetings, potential issues of concern were identified by the BLM-FFO and EIS.

Based on the lack of disturbance, size and scale, routine nature, and potential impacts associated with the proposed action, no additional external scoping was conducted. No public comments were received for the proposed action.

1.6.2. Issues

Issues Analyzed

The following issues were identified during internal scoping 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 proposed project impact air resources?
- How would vegetation-clearing, proposed project activities, and final reclamation impact the following BLM Special Status Species (SSS): Aztec gilia (*Aliciella formosa*), Brack's fishhook cactus (*Sclerocactus cloveriae* var. *brackii*), Bendire's thrasher (*Toxostoma bendirei*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), pinyon jay (*Gymnorhinus cyanocephalus*), and prairie falcon (*Falco mexicanus*)?
- How would surface-disturbing activities associated with construction of the proposed project impact cultural resources?
- Would drilling the proposed wells impact surface and groundwater resources?

Issues Considered but not Analyzed

The following issues were identified during scoping 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.

U.S. Fish and Wildlife Service (USFWS)-Listed Species

As noted previously, cumulative effects of the RMP to federally listed species and their associated habitats were addressed in the PRMP/FEIS. Based on a review of species currently listed by the USFWS as occurring in Rio Arriba County (USFWS 2014), as well as the location of the proposed project area and habitat within the proposed project area, the potential does not exist for USFWS-listed species to occur within the proposed project area. Additionally, the proposed project will not result in surface disturbance and as a result a Biological Survey Report [BSR] was not required. Water for drilling would be obtained from the permitted Blanco Trading Post (WR711) water wells; no unaccounted-for water depletions within USFWS-listed fish habitat would occur. Therefore, there is no need for additional Section 7 consultation.

Native American Religious Concerns

For the proposed action, identification efforts for Native American Religious Concerns were limited to a review of existing published and unpublished literature (e.g., Van Valkenburgh 1941, 1974; Brugge 1993; Kelly, et al. 2006), development of the site-specific Class III survey reports prepared for the proposed action (La Plata Archaeological Consultants [LAC] Report Nos. 2013-5nn [LAC 2013]), and a review by the BLM's cultural resources program regarding the presence of Traditional Cultural Properties (TCPs) identified through ongoing BLM tribal consultation efforts. There are currently no known remains that fall within the purview of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA; 25 USC 3001) or the Archaeological Resources Protection Act (ARPA; 16 USC 470) within the proposed project area. The proposed action would not impact any known TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere with or hinder the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act of 1978 (AIRFA; 42 USC 1996) or Executive Order (EO) 13007.

Paleontology

The proposed project area is not within a Specially Designated Area (SDA), which is managed to facilitate scientific study and protect paleontological resources (BLM 2003a, N-94). The proposed project is within

existing disturbance and will not result in any additional ground disturbance. Therefore, no impacts to paleontological resources are anticipated as a result of the proposed project.

2. PROPOSED ACTION AND ALTERNATIVE(S)

The “No-Action” alternative would deny the approval of the APDs, causing the project not to take place. Aside from the “No-Action” alternative, no other feasible alternatives were identified for the Project based on the Proposed Action being the only alternative that would eliminate the need for new disturbance.

2.1. Proposed Action

The proposed action is the approval of three APDs by the BLM-FFO for the Project. The Project includes the horizontal drilling, production and final abandonment of the 209H, 210H, and 271H oil and natural gas wells. These wells will develop federal minerals in the Counselors Gallup-Dakota pool of the Mancos Shale Formation from a surface location positioned on surfaced owned and managed by New Mexico State Land Office. Well pad plats associated with the Project can be found in Appendix B.

2.1.1. Location of Proposed Project Area

Maps of the proposed project area are provided in Appendix A. The proposed project area is plotted on the Counselor, New Mexico, 7.5-minute USGS quadrangle and the 2011 New Mexico Resource Geographic Information System Program aerial photograph.

The Project is located on lands owned and managed by New Mexico State Land Office in Rio Arriba County, New Mexico. The Project is positioned 55 miles south-southeast of the town of Bloomfield, New Mexico; 18 miles east-southeast of the community of Nageezi; 0.14 mile north of U.S. Highway 550; and 1.30 miles west of County Road 379.

The general region surrounding the proposed project area is characterized by badlands, mesas, and relatively flat lowland valleys. There are many broad, braided, shallow washes in the area. Specifically, the proposed project area sits at an elevation of approximately 6,859 feet above mean sea level (AMSL). The proposed project area is located in upper Escrito Canyon with a gradual slope and northeasterly aspect.

Legal land description of the proposed Project and locations of the proposed 209H, 210H, 271H bottom holes and surface holes (wellheads) are provided in Table 1 and

Table 2, below.

Table 1. Legal Land Description for the Proposed Project

Township, Range	Section	Quarter-Quarter	Project Feature

Township 23 North, Range 6 West	16	southwestern ¼ southwestern ¼ northwestern ¼ southwestern ¼	Existing Well Pad & Access Road

Table 2. Bottom Hole and Surface Hole Locations

Project Feature	North American Datum 1983		Footages (NMPM)
	Latitude	Longitude	
209H			
Bottom Hole	36.224828° North	107.499583° West	2482 feet from the south line, 397 feet from the west line
Surface Hole (Wellhead)	36.221476° North	107.481797° West	1410 feet from the south line, 361 feet from the west line
210H			
Bottom Hole	36.219557° North	107.500521° West	554 feet from the south line, 17 feet from the west line
Surface Hole (Wellhead)	36.221368° North	107.481730° West	1371 feet from the south line, 377 feet from the west line
271H			
Bottom Hole	36.228280° North	107.502047° West	1439 feet from the north line, 262 feet from the east line
Surface Hole (Wellhead)	36.221530° North	107.481830° West	1430 feet from the south line, 353 feet from the west line

2.1.2. Description of Proposed Project

For a detailed description of design features associated with the proposed action, refer to the APDs on file at the BLM-FFO. Survey plats associated with the proposed project provide additional details (Appendix B).

Design Features and Best Management Practices

WPX would adhere to the Conditions of Approval (COAs) attached to the approved APDs. The following general design features and best management practices (BMPs) would occur.

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.

A closed-loop system would be utilized for all wells. WPX would follow NMOCD “Pit Rule” guidelines and Onshore Order No. 1 (issued under Onshore Oil and Gas Operations [43 CFR 3160]) regarding closed-loop systems. No blow pit would be used for the proposed project. Drilling of the horizontal lateral may be done with water-based mud. All water-based mud cuttings would be hauled to a commercial disposal facility or land farm.

Protection of Cultural Resources

All cultural resource stipulations would be followed as indicated in the Cultural Resource Records of Review, attached to the COAs in the approved APDs.

Employees, contractors, and sub-contractors associated with the proposed project would be informed by WPX that cultural sites are to be avoided by personnel, personal vehicles, and company equipment. These individuals would be informed that it is illegal to collect, damage, or disturb cultural resources, and that such activities are punishable by criminal and/or administrative penalties under the provisions of the ARPA.

Protection of Flora and Fauna, including SSS and Livestock

The proposed project area and access road is in close proximity of an active golden eagle territory. No construction, drilling, completion, or work-over activity is permitted between 2/1 – 6/30 without approval by a BLM/FFO biologist/supervisor. This is in accordance to the Bald and Golden Eagle Protection Act.

Because the proposed project would not result in new ground disturbance or construction there is no need for migratory bird nest surveys during the migratory bird breeding season (May 15 through July 31).

The proposed wells would each have a closed-loop system.

The SLO timing restriction for drilling activities proposed on SLO lands that are within ≤0.5 mile of an active nest will be enforced. Activity shall not take place between 15 January and 1 July. In the event an active nest is observed to have nestlings that fledge before 1 July, drilling activity may proceed. This determination shall be carried out by a qualified SLO or third party biologist. If conducted by a third party biologist, they shall relay the information to the SLO biologist before activity begins.

Wildlife hazards associated with the proposed project would be fenced, covered, and/or contained in storage tanks, as necessary.

Livestock grazing operators in the vicinity of the proposed project area would be contacted by WPX at least 10 days prior to operations. Open holes would be barricaded to ensure the safety of livestock and wildlife. If present, any range improvements (such as fences, gates, cattleguards, or waterlines) disturbed during drilling, completion, or reclamation activities would be repaired to the condition they were in prior to disturbance. Repairs, if needed, would take place immediately following the disturbance.

Protection of Topsoil

Vehicle/equipment traffic would not be allowed to cross existing topsoil stockpiles. The topsoil would be protected using wattles or other BMPs so that erosion is minimized. If existing topsoil piles are stored for a length of time such that nutrients are depleted from the topsoil, amendments would be added to the topsoil as advised by the WPX environmental scientist or appropriate agent/contractor.

Protection of the Public

The hauling of equipment and materials on public roads would comply with Department of Transportation regulations. No toxic substances would be stored or used within the proposed project area. WPX would have inspectors present during construction. Any accidents involving persons or property would immediately be reported to the BLM-FFO. WPX would notify the public of potential hazards by posting signage, as necessary.

Prevention and Control of Weeds

It would be WPX's responsibility to monitor, control, and eradicate all invasive, non-native plant species within the proposed project area throughout the life of the project. The use of pesticides would comply with federal and state laws. Pesticides would be used only in accordance with their registered use and limitations.

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 (NO_x) emissions limited to 2 grams per horsepower hour, revegetating 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. Neither petroleum-based products nor produced water would be used.

BMPs for dust suppression would be utilized within the proposed project area to reduce fugitive dust when necessary. Water application, using a rear-spraying truck or other suitable means, would be the primary method of dust suppression within the proposed project area. Any additional dust-suppression practices would include the BLM-standard BMPs found in the *Gold Book* (BLM and USFS 2007) and the BMPs outlined in the COAs attached to the approved APDs.

Noise

Production would comply with noise standards outlined in NTL 04-2 FFO (BLM 2004). WPX would adhere to the noise stipulations, if any, included in the COAs attached to the approved APDs.

Additional Design Features and BMPs

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

No routine maintenance activities would be performed during periods when the soil is too wet to adequately support equipment. If equipment would create ruts deeper than six inches, the soil would be deemed too wet for construction or maintenance.

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

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

The proposed wells would each have an informational sign, as required by Onshore Oil and Gas Operations regulations (43 CFR 3160).

Proposed Project Phases

Construction

There would be no construction phase associated with the Project. The three proposed wells would be drilled from the existing Chaco 2306-16L #244H/#245H well pad and would not require any additional surface disturbance.

Production Facility Installation

Additional production facilities, including, but not limited to, tank batteries, water tanks, compressors, field gas separators, and electrical and automation equipment needed for the production of the three additional wells will be installed on the level well pad prior to drilling activities. All activities will take place within the well pad and construction zone.

Drilling and Completion

Drilling operations would be conducted in compliance with Federal Oil and Gas Onshore Orders and all applicable NMOCD rules and regulations. A mobile drilling rig ("rig") and other equipment would be transported to the location, where components would be assembled and the rig derrick erected. Other facilities and equipment that would be on the drilling site include: pipe racks, catwalk, hopper, rig personnel camper trailers, closed loop mud system, and personnel vehicles.

Drilling would begin, continuing through any fresh water bearing formations, then halt. A "shoe" (i.e. a seal) would be landed at the bottom of the hole, a surface pipe ("surface casing") would be installed from the surface down to the shoe, and then cement would be circulated between the rough wall of the well bore and the casing pipe ("annulus"). The casing would be pressure-tested to ensure that a seal has been created. Drilling would resume through several zones before reaching the target formation, or production zone. An intermediate casing would be installed and cemented in place through these zones in order to seal off any troublesome zones that may present problems in drilling deeper portions of the well. Drilling would resume, entering and continuing horizontally through the target formation to the bottom hole location. A production casing or "production liner" (shortened string of casing that suspends from the intermediate casing) will then be landed and cemented in place. Casings prevent interzonal interaction between oil and gas bearing zones and usable water zones and maintain the integrity of the bore. Drilling operations would continue 24-hours a day until complete. Drill cuttings would be hauled from the location and disposed of at an approved facility.

Following drilling, the drilling rig is typically moved off the location and a completion rig would take its place. Perforations would be shot through the production string across the zone of the target formation, to prepare for hydraulic fracturing. Fracturing materials, tanks, and pumps would also be moved to the location. The completion rig would connect to the perforated casing and begin fracturing the target formations through the perforations using pressurized water, fracturing fluids, and sand (to hold created subsurface fractures open).

After completion, the fluids (water and fracturing fluids) would be removed from the well bore and a well head would be installed. Completion fluids would be allowed to flow back to the on-site tanks. Water from fracturing would be confined to storage tanks and recycled and reused. Completion rigs are considered "daylight" rigs and operate during normal daylight hours only. Drilling and completion activities may take approximately 30 days per well depending on the well.

It is estimated that 23,000 barrels of useable water would be required to drill and complete each well. Of the 23,000 barrels, approximately 10,000 to 11,000 barrels would be recovered for reuse. Water for drilling and completion would be obtained from the San Juan Basin Water Haulers Association, who would retrieve and truck their water from a permitted water well (Blanco Trading Post [WR711] well). WPX would ensure that water would be obtained legally and that all required permits would be obtained prior to obtaining water.

WPX would follow NMOCD "Pit Rule" guidelines and Onshore Order No. 1 (issued under Onshore Oil and Gas Operations [43 CFR 3160]) regarding the placement and operation of closed-loop systems. No blow pits or cuttings pits would be used. 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

If the proposed wells prove to be productive, some portions of the proposed project area would be fully reclaimed (recontoured and reseeded), some portions would only be reseeded, and remaining portions ("working areas") would remain disturbed throughout the life of the proposed wells.

The well pad will include two working areas that will not be reseeded and will total 1.24 acres in total. One area being a 300-by-100-foot (0.70-acre) facility area located on the northwestern side of the proposed well pad. The second area being a teardrop with a 30-foot-wide (0.54-acre) driving surface located within the center of the proposed well pad to access the wells and facilities. Approximately 1.17 acres will be

reseeded but not recontoured during interim reclamation. These areas include the center of the teardrop (0.74 acre) and an approximately 210-by-180-foot area around each of the proposed wellheads for potential future activities, but would not be used on a daily basis. After accounting for the portion of this polygon that overlaps the teardrop and teardrop center, this region measures 0.43 acre. The remainder of the proposed well pad and construction zone (3.15 acres) would be fully reclaimed during interim reclamation

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 bulldozer and a tractor with seeding capabilities would be used. Approximately four personnel would be required.

In areas that would be fully reclaimed, slopes would be re-contoured to pre-construction topographical contours, if possible. WPX would diminish the evidence of cuts, fills, and flat well pad surfaces. In areas that are to be fully reclaimed or reseeded, stockpiled topsoil would be redistributed and the surface would be ripped and seeded. Sediment- and erosion-control features (including water diversions, silt traps, and culverts) would be installed, as necessary.

Production and Operation

The production phase of wells varies; the lifetime of the proposed wells is anticipated to be 30 to 50 years.

Production facilities would be located within a 300-by-100-foot facility area on the northwestern side of the proposed well pad. Production equipment that would remain on the proposed well pad could include, but is not limited to, the following: wellhead, production unit, meter run, compressor, flare stack, water tanks, and oil tanks. The tear drop for the proposed well pad would consist of a looped, 30-foot-wide driving surface; the tear drop would be used to access the proposed wellheads and other facilities.

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 Juniper Green to blend with the surrounding environment. Production facilities would be placed, to the extent practical, to minimize visual impacts.

During production, normal upkeep would be required to monitor production and resolve any problems. It is anticipated that two to three pick-up trucks would visit the proposed well pad daily during the normal work week.

Occasionally, workover or recompletion of the proposed wells would be necessary to ensure that efficient production is maintained. Workovers and recompletions would be scheduled as needed to improve and maintain production of the wells. Workover activities could include repairs to the wellbore equipment (e.g., casing, tubing, rods, and pump), wellheads, or production facilities. A 210-foot-by-180 foot workover area would surround each of the proposed wellheads. This workover area could be used for future activities within the proposed well pad but would not be used for daily activities.

Final Reclamation and Abandonment

If the proposed wells prove to be unproductive, or when the proposed wells are no longer commercially viable, they would be plugged and abandoned. Downhole well abandonment would be carried out under current BLM-FFO and state regulations. The bore holes would be plugged with cement and the production facilities removed. An aboveground marker would be placed over the plugged holes. The markers would each contain individual well identification information.

The final reclamation phase is anticipated to take less than one week. WPX 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 proposed project to as close to pre-construction conditions as possible, by re-contouring and re-seeding to blend with the surrounding terrain. Portions of the proposed project area that were not fully reclaimed during interim reclamation would be cleared (if vegetated), re-contoured, covered with salvaged topsoil, and seeded. Sediment- and erosion-control measures would be implemented, as necessary. Water bars would be installed across the road, 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.

2.1.3.

Surface Disturbance

The Project would not result in any additional disturbance. Of the existing disturbed area on the well pad, approximately 3.15 acres would be fully reclaimed and 1.17 acres would be reseeded (but not recontoured) during interim reclamation. The remainder (1.24 acres) would be stabilized and used as a working surface throughout the life of the proposed project, and would be fully reclaimed during final reclamation.

Table 3. Surface Disturbance Acreage Associated with Proposed Project

Feature	Acreage		Description of New Disturbance Acreage Following Interim Reclamation		
	Total	New Disturbance	Fully Reclaimed (Reseeded and Recontoured)	Reseed Only	Unreclaimed
Well Pad & Construction Zone	5.56	0	3.15	1.17	1.24
Access Road 1	0.31	0	-	-	0.31
Access Road 2	0.19	0	-	-	0.19
Total	**6.06**	**0**	**3.15**	**1.17**	**1.74**

Well pad and construction zone

The well pad dimensions are 506 feet by 300 feet (3.48 acres) with an additional 50-foot construction buffer zone on all four sides (2.08 acres). The resulting area would encompass a 5.56-acre working area. This entire area will be utilized during construction, setting of production equipment, and drilling and completion phases. Once these phases are complete, the well pad will be interim reclaimed.

Access road 1

The existing access road is 968 feet long with a 14-foot-wide running surface and the bottoms of the bar ditches along either side of the road (approximately 0.31 acre, total) would be utilized for the lifetime of the project.

Access road 2

The existing access road is 581 feet long with a 14-foot-wide running surface and the bottoms of the bar ditches along either side of the road (approximately 0.19 acre, total) would be utilized as a secondary access for the lifetime of the project.

2.2. No Action

Under the No Action Alternative, the 3 APDs would not be approved. The proposed wells would not be drilled. Current land and resource uses would continue to occur in the proposed project area.

2.3. Alternatives Analyzed in Detail

Because the proposed project would result in no new disturbance, no reasonable alternatives to the proposed action have been developed that would result in fewer impacts or any clear advantages over the proposed action.

2.4. Alternatives Considered but Eliminated from Detailed Study

Because the proposed project would result in no new disturbance, no reasonable alternatives to the proposed action have been developed that would result in fewer impacts or any clear advantages over the proposed action.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the environment that would be affected by implementation of the proposed action described in Chapter 2. Aspects of the affected environment described in this chapter focus on the relevant major resources or issues. Certain critical environmental components require analysis under BLM policy. These items are included above in Section 1.6.2.

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 2008b).

3.1. Air Resources

3.1.1. Affected Environment

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

Much of the information referenced in this section is incorporated from the Air Resources Technical Report for BLM Oil and Gas Development in New Mexico, Kansas, Oklahoma, and Texas (herein referred to as Air 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 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 Farmington Field Office area are in attainment of all National Ambient Air Quality Standards (NAAQS) as defined by the Clean Air Act (U.S. Environmental Protection Agency, 2013). The area is also in attainment of all state air quality standards (NMAAQS). The current status of criteria pollutant levels in the Farmington Field Office 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 (U.S. Environmental Protection Agency, 2014)

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 pb[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)

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 (U.S. Environmental Protection Agency, 2012). 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 (50-100), unhealthy for sensitive groups (100-150), 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% 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 101-150) or worse (U.S. Environmental Protection Agency, 2013a)

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

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 (U.S. Environmental Protection Agency, 2012).

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 (^{O}F [1])	Average Maximum Temperature (^{O}F)	Average Minimum Temperature (^{O}F)	Average Precipitation (inches)
January	30.5	40.8	20.3	0.53
February	35.8	46.8	24.8	0.59
March	43.2	56.1	30.3	0.78
April	50.4	64.7	36.2	0.65
May	60.4	74.8	46.1	0.54
June	69.8	85.1	54.5	0.21
July	75.4	89.6	61.2	0.90
August	73.2	86.5	59.8	1.26
September	65.4	79.1	51.7	1.04
October	53.3	66.4	40.1	0.91
November	40.5	52.2	28.8	0.68
December	31.0	41.2	20.7	0.50

Source: data collected at New Mexico State Agricultural Science Center - Farmington
[1] degrees Fahrenheit

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 A (the Proposed Action)

Methodology and assumptions for calculating air pollutant and greenhouse gas emissions are described in the Air Resources Technical Report (BLM 2014). This document incorporates the sections discussing

the modification of calculators developed by the BLM to address emissions for one horizontal oil well. The calculators give an approximation of criteria pollutant, HAP, and greenhouse gas (GHG) emissions to be compared to regional and national emissions levels. 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

Criteria Pollutants

For comparison, Table 8 shows total human-caused emissions for each of the counties in the FFO and La Plata County, Colorado, based on USEPA's 2011 emissions inventory (U.S. Environmental Protection Agency, 2014).

Table 7 shows estimated emissions from one proposed horizontal oil well 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 and La Plata County, Colorado, based on USEPA's 2011 emissions inventory (U.S. Environmental Protection Agency, 2014).

Table 7. Criteria Pollutant and VOC Emissions Estimated for Construction of One Horizontal Oil Well; Average 25 Days to Drill and Complete

Activity	NOx	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH4	CO2
One time operations (tons)*								
Construction	5.5	1.5	0.5	2.5	0.25	0.1	0.007	598.85
Completion	0.5	0.1	0.03	0.025	0.025	-	-	55.00
Interim Reclamation	0.006	0.006	0.006	0.001	-	0.003	-	1.24
Final Reclamation	0.006	0.006	0.006	0.001	-	0.004	-	1.66
Ancillary Operations (tons)								
Workover	0.129	0.04	0.01	0.01	0.01	-	-	10.59
Road Maintenance	-	-	-	-	-	-	-	0.26
Road Traffic	-	-	-	-	-	-	-	0.06
Annual operations (tons/yr)								
Oil Haul Truck and Small Truck (100 bbl/day)	0.009	0.006	0.0012	0.0009	0.0008	-	0.0001	3.88
Total	**6.13**	**1.64**	**0.55**	**2.54**	**0.29**	**0.11**	**0.01**	**671.54**

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
Total	**70,340.5**	**127,435.2**	**53,525.0**	**219,838.9**	**25,487.6**	**7,110.0**

(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 one horizontal oil well.

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	70,340.5	127,435.2	53,525.0	219,838.9	25,487.6	7,110.0
Conventional Gas Well Emissions	6.13	1.64	12.55(8)	2.54	0.29	0.11
Percent Increase	**0.009**	**0.001**	**0.02**	**0.001**	**0.001**	**0.002**

(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% 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% if their oil storage tanks emit over 6 tons of VOC emissions per year. A reduction of 95% 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 active oil and gas 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. Water Resources

3.2.1. Affected Environment

Surface Water

Under the Clean Water Act, the US Army Corps of Engineers (USACE) has jurisdiction over "waters of the U.S." These jurisdictional waters include those that have a "significant nexus" to traditional navigable waters. The BLM/FFO and USACE Durango Regulatory Division have determined that jurisdictional waters may include USGS watercourses (i.e., "blue line" on USGS 1:24,000 topographic maps).

Groundwater

Within a 1-mile radius of the proposed well pad, there are no recorded water wells (New Mexico Office of the State Engineer 2014). Therefore, the depth to groundwater in the vicinity of the proposed area is unknown.

3.2.2. Impacts from Alternative A (the Proposed Action)

Direct and Indirect Impacts

<u>Impacts to Surface Water</u>

Activities associated with the proposed wells do not cross any USGS watercourses.

<u>Impacts to Groundwater</u>

Stimulation (i.e., hydraulic fracturing or "fracing") 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 (99.5

percent) and chemical additives (0.5 percent), are pumped into a geologic formation at high pressure during hydraulic fracturing (USEPA 2004). Chemicals added to stimulation fluids may include friction reducers, surfactants, gelling agents, scale inhibitors, acids, corrosion inhibitors, antibacterial agents, and clay stabilizers. When the fracing pressure exceeds the rock strength, the fluids open or enlarge fractures that typically extend several hundred feet away from the well bore. After the fractures are created, a propping agent (usually sand) is pumped into the fractures to keep them from closing when the pumping pressure is released. After fracturing is completed, a portion of the injected fracturing fluids returns to the wellbore and is recovered for future fracturing operations (USEPA 2004) or disposal. Stimulation techniques have been used in the United States since 1949 and in the San Juan Basin since the 1950s. Over the last 10 years, advances in multi-stage and multi-zone hydraulic fracturing have allowed development of gas fields that previously were uneconomic, including the San Juan Basin.

Hydraulic fracturing is a common process in the San Juan Basin and applied to nearly all wells drilled. The producing zone targeted by the proposed 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 water or freshwater-bearing groundwater aquifers are expected to occur from hydraulic fracturing of the proposed wells.

Cumulative Impacts

As no direct or indirect impacts to groundwater are anticipated as a result of the proposed project, there would be no cumulative impacts.

3.3. Special Status Species

3.3.1. 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 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 2011a, BLM 2011b, BLM 2011c, BLM 2012a). 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 2008a, 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.

Based on known range and habitat, several BLM SSS have the potential to occur within the proposed project area. The SSS with the potential to occur within the proposed project area are as follows:

- Bendire's thrasher (BLM Sensitive): potential foraging and nesting habitat available adjacent to existing well pad
- Ferruginous hawk (BLM Sensitive and SMS): potential foraging habitat available adjacent to existing well pad

- Golden eagle (BLM SMS): potential foraging habitat available adjacent to existing well pad and active nest identified approximately 0.43 miles from existing well pad
- Pinyon jay (BLM Sensitive): potential foraging habitat available adjacent to existing well pad
- Prairie falcon (BLM SMS): potential foraging habitat available adjacent to existing well pad

3.3.2. Impacts from Alternative A (the Proposed Action)

Direct and Indirect Impacts

Bendire's Thrasher

Breeding range for the Bendire's thrasher extends from southeastern California and southern Nevada to the eastern third of New Mexico, and from southern Utah and Colorado south into Sonora and Chihuahua, and along the Pacific slope of Mexico to Sinaloa. Distribution appears to be patchy within the breeding range, with details still being poorly understood. The thrasher breeds in scattered locations in central and western portions of New Mexico, most commonly in the southwest part of the state. In winter the species withdraws from the northern portion of its summer range, including breeding areas in the Mojave and Great Basin deserts and the Colorado Plateau (NMPIF 2007).

The proposed project will result in no new surface disturbance within the area. Additionally, drilling and completions activities are expected to occur between 2 July and 14 January, and mostly outside of the typical breeding season (15 May to 31 July). As such, no active nests surrounding the action area are expected to be directly impacted. Due to the mobility of adult birds, it is unlikely that adult birds would be directly impacted by the proposed project.

Audial and visual disturbances associated with the proposed project could temporarily deter this species from utilizing the proposed project area and immediately adjacent lands.

Pinyon Jay

The pinyon jay's range extends across much of the Intermountain West and southwest. It is a resident from central Oregon and eastern California east to the Dakotas and eastern New Mexico, and from southern Idaho and Montana south to central portions of New Mexico and Arizona. It typically winters throughout its breeding range but expands into surrounding regions when pine cone crops fail. The species is found in foothills through New Mexico, wherever large blocks of pinyon-juniper woodland habitat are present. They are primarily associated with pinyon-juniper habitat but sometimes will occur in areas dominated by ponderosa pine, sagebrush, or chapparal vegetation. During the pinyon jay summer breeding/ nesting season (mid-February through late summer/fall), this bird species is highly social and breeds in large breeding colonies. The colonial nesting sites are typically located in dense, mature stands of pinyon-juniper woodlands (NMPIF 2007).

The proposed project will result in no new surface disturbance within the area. Due to the mobility of adult birds, it is unlikely that adult birds would be directly impacted by the proposed project. Audial and visual disturbances associated with the proposed project could temporarily deter this species from utilizing the proposed project area and immediately adjacent lands.

Golden Eagle

Golden eagles are year-round residents of New Mexico and breed in suitable habitat throughout the state. Suitable nesting sites may occur within a variety of habitats, from desert to mountain areas. Typically, dense forests tend to be avoided and the most common areas in New Mexico include steep-walled mountain canyons. Cliffs are the most common nesting substrate; however, trees or man-made structures are sometimes used. Nests usually located in an area having a wide view of the surrounding area and are on prominent escarpments, with proximity to hunting grounds playing an important role in nest-site selection (NMPIF 2007).

There is a golden eagle nest located on SLO lands approximately 0.43 miles from the proposed project area. The nest was found to be active during the 2014 breeding season. There is a SLO enforced timing restriction for drilling activities proposed on SLO lands that are within ≤0.5 mile of an active nest. Activity shall not take place between 15 January and 1 July. In the event an active nest is observed to have nestlings that fledge before 1 July, drilling activity may proceed. This determination shall be carried out by a qualified SLO or third party biologist. If conducted by a third party biologist, they shall relay the information to the SLO biologist before activity begins. In addition to this timing restriction, the nest is located outside of the 1/3 mile buffer restriction enforced by the FFO-BLM. Based on the nest being outside the 1/3 mile buffer and with the implementation of the SLO timing restriction for the active nest; it is unlikely that the proposed project would result in 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

The proposed project will result in no new surface disturbance within the area. Due to the mobility of adult raptors, it is unlikely that adult birds would be directly impacted by the proposed project. Audial and visual disturbances associated with the proposed project could temporarily deter this species from utilizing the proposed project area and immediately adjacent lands.

Ferruginous Hawk and Prairie Falcon

Breeding habitat for the ferruginous hawk extends across the northern two-thirds of New Mexico and the species can be found throughout the state during the winter. They typically occur in open areas containing broad expanses of prairie grassland and shrub-steppe vegetations. Landscapes with low to moderate agricultural coverage may be used for nesting and foraging, and agricultural fields may serve as important foraging areas due to high prey densities, making proximity to these areas important in nest-site selection. The species uses transitional and edge areas between grassland and juniper savannah or pinyon-juniper woodland (NMPIF 2007).

Prairie falcon breeds from southern Canada south to central Mexico and from interior portions of the Pacific states east to the Dakotas, eastern Colorado and New Mexico, and west Texas. In winter its range extends further east, and west to the Pacific coast. They are sparsely distributed across New Mexico and can be found in appropriate habitat including arid plains and steppes at all elevations, wherever cliffs and bluffs present cliff ledges or crevices for nesting. They will occasionally nest in trees, power poles, buildings and steep sides of arroyos (NMPIF 2007).

Due to the mobility of adult raptors and the lack of appropriate nesting sites for ferruginous hawks and prairie falcons in the vicinity of the proposed project area, it is unlikely that the proposed project would result in 1) injury to a raptor, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

There is similar habitat available in the surrounding area that these SSS raptors could utilize for foraging. The proposed project would not result in new surface disturbance of foraging habitat for these species. Approximate 4.32 remaining acreage of the existing disturbance 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, native vegetation communities would become re-established within the proposed project area.

Well equipment would cause increased noise levels in the vicinity of the proposed project area. Occasional human and vehicle presence within the vicinity of the proposed project area would increase above present levels. Audial and visual disturbances associated with the proposed project could cause indirect habitat loss by deterring these raptors from using available habitat adjacent to the proposed project area.

Cumulative Impacts

The FFO would continue to manage non-federally listed species according to BLM policies and guidelines, with the goal of contributing to the conservation of these species to reduce the potential for being listed under the ESA of 1973, as amended (BLM 2003a, 4-111). For reasonably foreseeable actions on federal lands, direct impacts to SSS would be avoided through the BLM's siting criteria. Development on state land would not result in removal of SSS habitat, as it does not result in new surface disturbance, but may modify potential SSS habitat with an increase in human activity in the area and could result in the displacement of individuals in the area. There effects would be related to availability of undisturbed habitat in the area and the amount of disturbance that would occur within the area. The PRMP/FEIS determined that cumulatively up to 5.5 percent (128,000 acres) of vegetation in the planning area could be impacted by oil and gas development (BLM 2003a, page 4-125). Other reasonably foreseeable actions within the planning area that could impact SSS would include livestock grazing, agriculture, commercial and residential development, mining, wildlife and vegetation management.

3.4. Cultural Resources

3.4.1. Affected Environment

The proposed project area is located within the archaeologically rich San Juan Basin of northwestern New Mexico. In general, the history of the San Juan Basin can be divided into five major periods: PaleoIndian (circa [ca.] 10,000 B.C. to 5,500 B.C.); Archaic (ca. 5,500 B.C. to A.D. 400); Basketmaker II-III and Pueblo I-IV (aka Anasazi; A.D. 1-1,540); and historic (A.D. 1,540 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 PRMP/FEIS (BLM 2003a, 3-65 – 3-84) and will not be reiterated here. Additional information can also be found in an associated documented, the Cultural Resources Technical Report (Science Applications International Corporation 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.

Alternative A (The Proposed Action)

The entire Area of Potential Effect (APE) for the proposed action was archaeologically surveyed by LAC at a BLM Class III (100-percent) level. The archaeological reports, LAC Report No. 2013-5nn (LAC 2013; BLM 2014(I)032F) and LAC Report 2013-5pp (LAC 2014; no BLM number), were prepared and submitted to the BLM in accordance with the *Procedures for Performing Cultural Resources Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities* (BLM 2005).

The Class III inventories resulted in two National Register eligible sites outside of the previously built multiple well pad and and access.

3.4.2. Impacts from Alternative A (the Proposed Action)

Direct and Indirect Impacts

Direct impacts normally include alterations to the physical integrity of a cultural site. If a cultural site is significant for other than its scientific information, direct impacts may also include the introduction of audible, atmospheric, or visual elements that are out of character for the cultural site. A potential indirect impact from the proposed action is the increase in human activity or access to the area with the increased potential of unauthorized removal of or other alteration to cultural sites in the area.

Significant cultural sites (e.g., sites eligible for the NRHP) were avoided with the implementation of design features such as, but not limited to, reduction of construction areas, installation of temporary barriers, and site monitoring and will continue to be protected with additional design features to avoid the unauthorized removal of or other alteration to cultural sites in the area. These design features are detailed in the Cultural Resource Record of Review, attached to the COAs in the approved APDs. The proposed action

would not be expected to physically threaten any TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere with or otherwise hinder the performance of traditional ceremonies/rituals. The proposed action would have no direct or indirect impact on significant cultural sites.

Cumulative Impacts

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

4. SUPPORTING INFORMATION

4.1. Tribes, Individuals, Organizations, or Agencies Consulted

The following tribes, individuals, organizations, and/or agencies were consulted during the development of this EA:

- Heather Riley, WPX
- Larry Higgins, WPX
- Andrea Felix, WPX
- Lacey Granillo, WPX
- Mark Lepich, WPX
- Steven Fuller, LAC

4.2. List of Preparers

This EA was prepared by EIS in conformance with the standards of and under the direction of the BLM-FFO. The following individuals assisted in the preparation of this EA:

- Mindy Paulek, Biologist, EIS
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- Craig Willems, Natural Resources Specialist, BLM-FFO
- Sheila Williams, District Botanist, BLM-FFO
- John Hansen, Wildlife Biologist, BLM-FFO
- John Kendall, Wildlife Management Biologist, BLM-FFO
- Jim Copeland, Archaeologist, BLM-FFO
- Sherrie Landon, Paleontologist and Environmental Protection Specialist, BLM-FFO
- Esther Willetto, Tribal Program Coordinator, BLM-FFO
- Roger Herrera, Environmental Protection Specialist, BLM-FFO

4.3. References

Brugge, David M. 1993. An Investigation of AIRFA [American Indian Religious Freedom Act] Concerns Relating to the Fruitland Coal Gas Development Area. Albuquerque, New Mexico: Office of Contract Archaeology, University of New Mexico. Ms. on file at BLM-FFO.

Bureau of Land Management (BLM). 2003a. Farmington Proposed Resource Management Plan and Final Environmental Impact Statement (PRMP/FEIS). Farmington, New Mexico: BLM-FFO.

_____. 2003b. Farmington Resource Management Plan with Record of Decision. (RMP and ROD). Farmington, New Mexico: BLM-FFO.

_____. 2004. Notice to Lessees and Operators on Onshore Oil and Gas Leases Within the Jurisdiction of the Farmington Field Office - Management of Sound Generated by Oil and Gas Production and Transportation (NTL 04-2 FFO). Farmington, New Mexico: BLM-FFO.

_____. 2005. *Procedures for Performing Cultural Resources Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities.* BLM Manual Supplement H-8100-1. New Mexico, Oklahoma, and Texas.

_____. 2008a. BLM Manual 6840: Special Status Species Management.

_____. 2008b. BLM National Environmental Policy Act Handbook H-1790-1. Washington, D.C.: BLM National Environment Policy Act Program Office of the Assistant Director, Renewable Resources and Planning.

_____. 2008c. Memorandum: Farmington Field Office (FFO) Special Management Species Policy 2008 Update. Farmington, New Mexico: BLM-FFO.

_____. 2011a. BLM New Mexico Sensitive Birds List. Revised August 2011.

_____. 2011b. BLM New Mexico Sensitive Mammals List. Revised July 2011.

_____. 2011c. BLM New Mexico Sensitive Molluscs, Crustaceans, and Arthropods List. Revised August 2011.

_____. 2012a. BLM New Mexico Sensitive Plants List. January.

_____. 2014. Air Resources Technical Report for Oil and Gas Development. Santa Fe: U.S. Department of Interior Bureau of Land Management.

Bureau of Land Management (BLM) and U.S. Forest Service (USFS). 2007. The Gold Book: Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development – 4th Edition, revised in 2007.

Bureau of Land Management, Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers. 1997. Programmatic Agreement Among the Bureau of Land Management, the Advisory Council On Historic Preservation, and the National Conference Of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet its Responsibilities Under the National Historic Preservation Act. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/coop_agencies.Par.88790.File.dat/PA_Final_03_1997.pdf.

Kelly, Klara, Rena Martin, Richard Begay, Ted Neff, and Clifford Werito. 2006. We Will Help You With What We Know: Diné Traditional Cultural Places In Dinétah. Flagstaff, Arizona: Museum of Northern Arizona Environmental Solutions, Inc. Ms. on file at BLM-FFO.

La Plata Archaeological Consultants (LAC). 2013. A Cultural Resources Survey of WPX Energy Production LLC's Chaco 2307-16L Number 209H/210H/243H/244H Multiple Well Pad and Access Road, Rio Arriba County, New Mexico. LAC Report 2013-5nn.

_____. 2014. A Cultural Resources Survey of WPX Energy Production LLC's Chaco 2307-16L Number 244H Access Road, Rio Arriba County, New Mexico. LAC Report 2013-5pp.

Natural Gas Supply Association. 2010. NaturalGas.org – Uses of Natural Gas. Available at: http://www.naturalgas.org/overview/uses.asp.

New Mexico Bureau of Geology and Mineral Resources. 2012. Available at: http://geoinfo.nmt.edu/.

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

New Mexico Office of the State Engineer. 2014. GIS shapefile: ose_wells_April2014. http://www.ose.state.nm.us/water_info_data.html.

New Mexico Partners in Flight (NMPIF). 2007. New Mexico Bird Conservation Plan Version 2.1. C. Rustay and S. Norris, compilers. Albuquerque, New Mexico.

Office of Natural Resources Revenue. 2012. Reported Royalty Revenue by Category – Fiscal Year 2011. Available at: http://www.onrr.gov/ONRRWebStats/Disbursements_Royalties.aspx?report=ReportedRoyaltyRevenuebyCategory&yeartype=FY&year=2011&datetype=AY.

Ortega, C.P. and C.D. Francis. 2007. Effects of Gas Well Compressor Noise on Breeding Birds in the Rattlesnake Canyon Habitat Management Area, San Juan County, New Mexico. Report to the Bureau of Land Management, Farmington Field Office. Final Report.

Science Applications International Corporation. 2002. Cultural Resources Technical Report: Background Information on Cultural Resources for the Farmington Draft RMP/EIS. Ms. on file at BLM-FFO, Farmington, New Mexico.

U.S. Department of Energy. 2011. Natural Gas Regulation. Available at: http://www.fossil.energy.gov/programs/gasregulation/index.html.

U.S. Energy Information Administration. 2012. Energy in Brief. Available at: http://www.eia.gov/energy_in_brief/major_energy_sources_and_users.cfm.

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

_____. (2012, May 21). *2005 National-Scale Air Toxics Assessment*. Retrieved February 27, 2014, from U.S. Environmental Protection Agency: http://www.epa.gov/ttn/atw/nata2005/

_____. (2013, December 5). *The Green Book Nonattainment Areas for Criteria Pollutants*. Retrieved February 25, 2014, from U.S. Environmental Protection Agency: http://www.epa.gov/airquality/greenbook/

_____. (2013a, November 15). *Air Quality Index Report*. Retrieved March 12, 2014, from U.S. Environmental Protection Agency: http://www.epa.gov/airdata/ad_rep_aqi.html

_____. (2014, February 7). *Air Trends: Design Values*. Retrieved February 25, 2014, from U.S. Environmental Protection Agency: http://www.epa.gov/airtrends/values.html

_____. (2014, February 3). *The 2011 National Emissions Inventory*. Retrieved February 27, 2014, from U.S. Environmental Protection Agency: http://www.epa.gov/ttn/chief/net/2011inventory.html

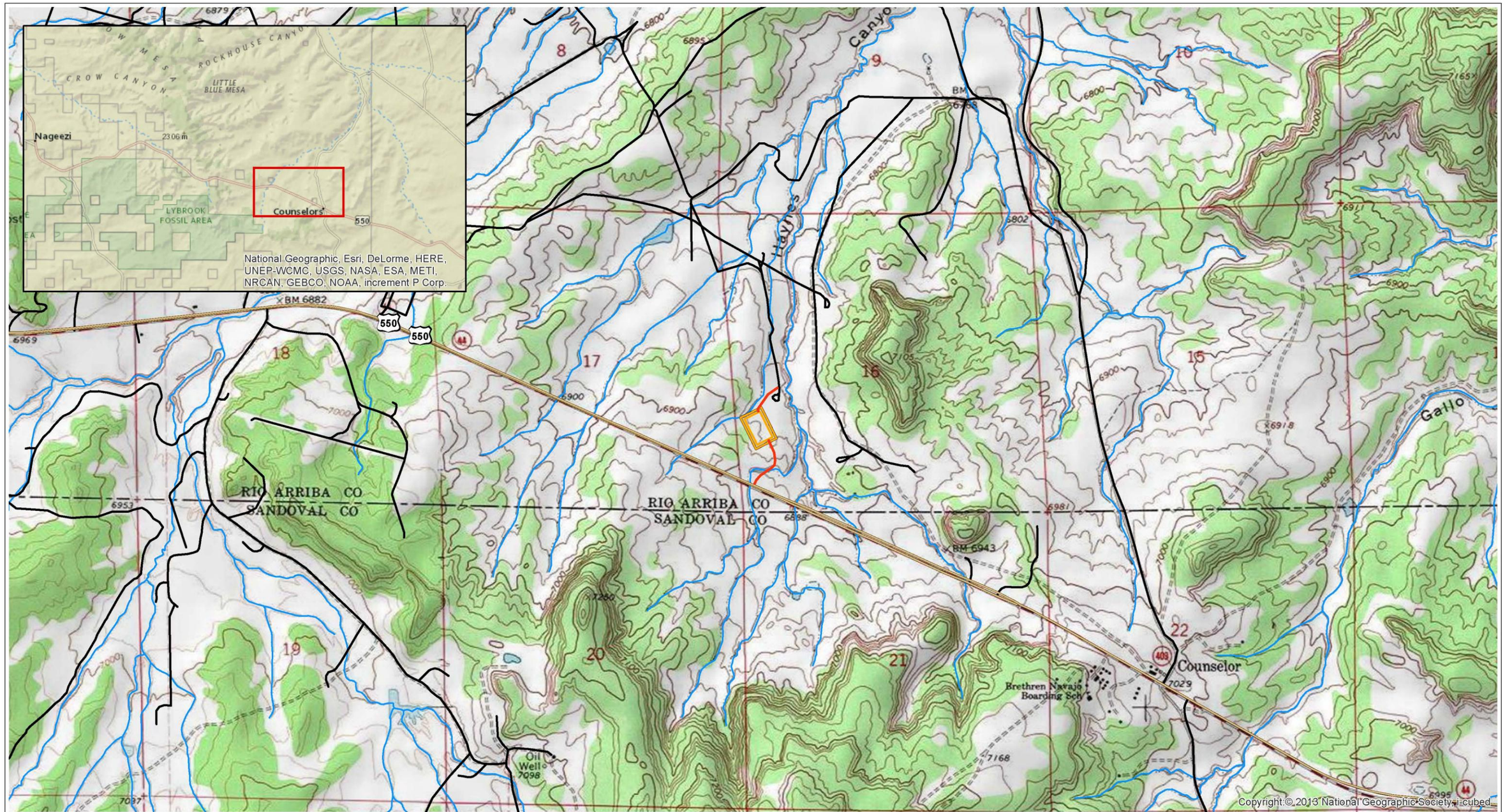
U.S. Fish and Wildlife Service (USFWS). 2014. Threatened and Endangered Species. U.S. Fish and Wildlife Service Environmental Conservation Online System. Available at http://ecos.fws.gov/ecos/home.action

U.S. Geological Survey (USGS). 1979. Notice to Lessees and Operators of Onshore Federal and Indian Oil and Gas Leases (NTL-3A). Reporting of Undesirable Events.

Van Valkenburgh, Richard F. 1941.Diné Bikeyah. Window Rock, Arizona: Department of the Interior, Office of Indian Affairs, Navajo Services. Ms. on file at BLM-FFO.

_____. 1974. Navajo Sacred Places. Edited by Clyde Kluckhohn. Garland American Indian Ethnohistory Series, Navajo Indians, 3 Vols. New York, New York: Garland Publishing.

APPENDIX A. MAPS



Legend

- Existing Access
- Existing Edge of Disturbance
- Existing Well Pad
- US Highways
- San Juan Basin Roads (WPX)
- USGS Watercourses

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WPX Energy Production, LLC's Chaco 2306-16L #209/#210H/#271H
Topographic Location Map

Section 16, Township 23 North, Range 6 West N.M.P.M
Lybrook and Counselor, NM USGS Quadrangle
Rio Arriba County, New Mexico

0 0.25 0.5 1 Miles

EIS Energy Inspection Services

WPXENERGY

Projection: WGS 1984 Web Mercator Auxiliary Sphere

Date: 10/1/2014 | Author: mpaulek

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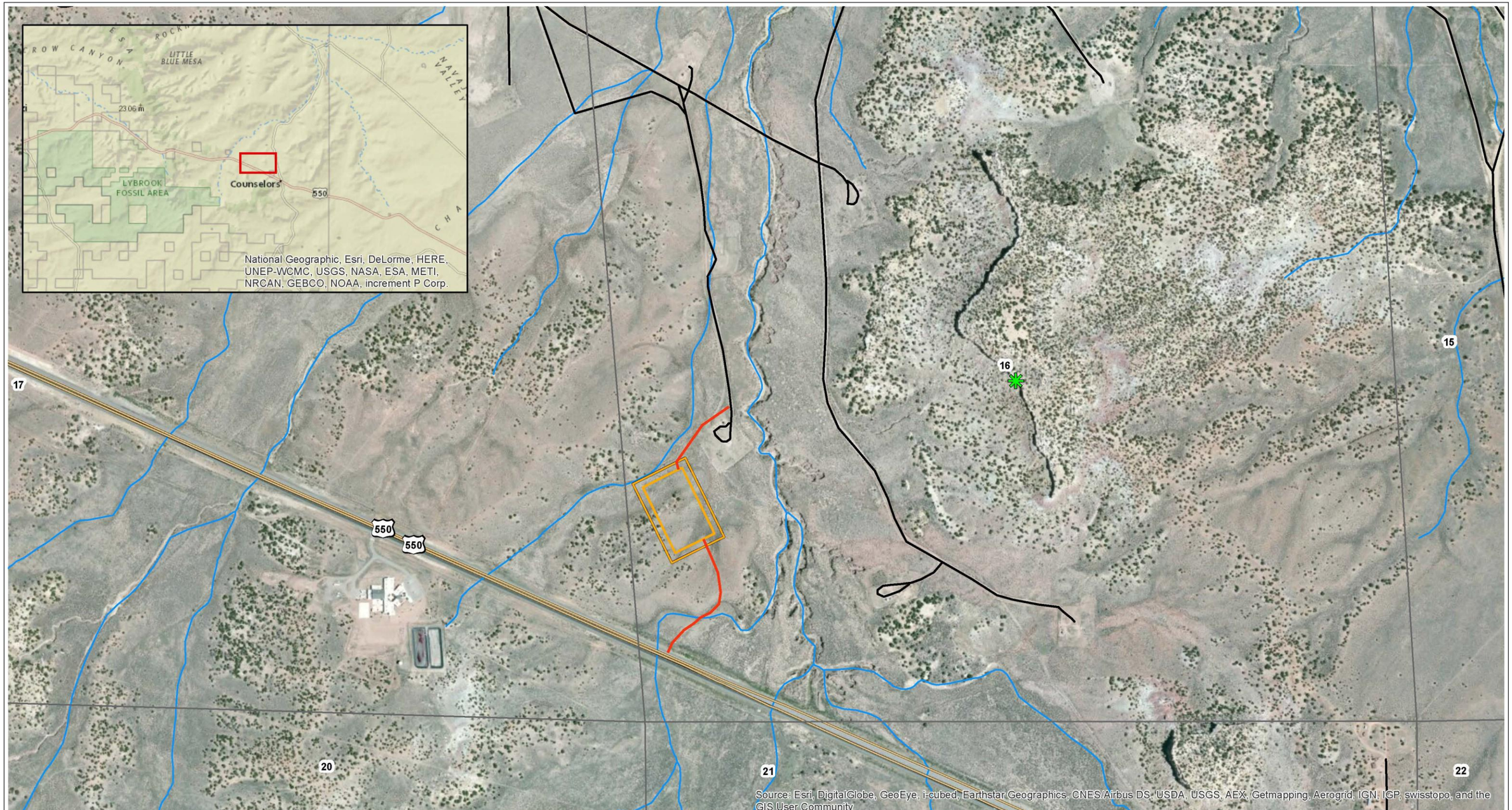

Legend
- Existing Access
- Existing Edge of Disturbance
- Existing Well Pad
- Active Golden Eagle Nest
- US Highways
- San Juan Basin Roads (WPX)
- USGS Watercourses

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WPX Energy Production, LLC's Chaco 2306-16L #209/#210H/#271H
Aerial Map

Section 16, Township 23 North, Range 6 West
New Mexico Principloe Meridian
Rio Arriba County, New Mexico

0 0.125 0.25 0.5 Miles

EIS Energy Inspection Services
WPXENERGY

Projection: WGS 1984 Web Mercator Auxiliary Sphere
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APPENDIX B. PLATS

APPENDIX C. PHOTOGRAPHS

Figure 1. Existing Well Pad Looking towards NNW Edge of Pad

Figure 2. Existing Well Pad Looking towards NE Edge of Pad

Figure 3. Existing Well Pad Looking towards SSE Edge of Pad

Figure 4. Existing Well Pad Looking towards SW Edge of Pad