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WPX Energy Production, LLC's Chaco 2307-12L Nos. 170H & 171H and Chaco 2307-13D Nos. 172H & 173H Oil and Natural Gas Well Projects

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

BLM

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1. PURPOSE AND NEED FOR ACTION

1.1. Background

WPX Energy Production, LLC (WPX) has submitted four Applications for Permit to Drill (APDs) and three Right-of-Way (ROW) Grants to the Bureau of Land Management – Farmington Field Office (BLM-FFO) for the Chaco 2307-12L Nos. 170H & 171H (170H/171H) and Chaco 2307-13D Nos. 172H & 173H (172H/173H) projects. The proposed action is the approval of the APDs and ROW Grants by the BLM-FFO, located in Farmington, New Mexico.

The proposed project areas are located on surface managed by the BLM-FFO. Each of the proposed projects would include the construction of a new well pad and access road; the horizontal drilling and possible production of two Lybrook Gallup natural gas and oil wells on the well pad; the usage of facilities throughout the life of the wells; and the final abandonment of facilities. The proposed 170H/171H wells would access federal minerals associated with valid, existing lease NMSF 78359. The proposed 172H/173H wells would access federal minerals associated with valid, existing lease NMSF 78360.

The four wells would each be authorized by an approved APD. The 170H/171H well pad is located on-lease and would be authorized via the 170H/171H APDs. The 170H/171H access road is located partially off-lease and the 172H/173H well pad and access road are located entirely off-lease; therefore, these three project features would each be authorized by a ROW Grant. Since the proposed 172H/173H access road starts at U.S. Highway 550, a New Mexico Department of Transportation permit would be secured for the proposed access road.

New surface disturbance associated with the proposed project areas would be 11.3 acres. This would include approximately 0.9 acre of new access road disturbance and 10.4 acres of new well pad disturbance. Of the 11.3 acres, 2.7 acres would be reseeded (but not recontoured) and 2.9 acres would remain disturbed throughout the lifetime of the projects. In addition, approximately 0.2 acre of a previously disturbed area associated with the proposed 172H/173H access road corridor would be reseeded (but not recontoured). Therefore, the net total of new surface disturbance associated with the proposed projects would be approximately 11.1 acres.

In addition, up to five staging areas (WPX's existing Chaco 2307-12E Nos. 168H and 169H [168H/169H] well pad, Range Production Company's [Range Production's] reclaimed Federal 12 No. 1 well pad, Elm Ridge Exploration Company LLC's [Elm Ridge's] Mancos Compressor Station, William's Midstream Vapor Recovery Tank Area [William's Tank Area], WPX's existing Chaco 2307-13L Nos. 174H and 175H [174H/175H] well pad, and/or Elm Ridge's existing Lybrook South No. 3 well pad; totaling 15.6 acres) could be used for the proposed projects. The proposed staging areas, with the exception of the William's Tank Area, are located on surface managed by the BLM-FFO. The William's Tank Area is located on Tribal surface. If these staging areas are used for the proposed projects, the staging areas would be permitted via a sundry or an existing agreement that WPX has in place with Range Production, Elm Ridge, and/or Williams.

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.

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 proposed project areas are located within the BLM-FFO, approximately 42 miles south-southeast of the town of Bloomfield, New Mexico, and approximately 12 miles east of the community of Nageezi (see Figure A.1, Appendix A).

1.2. Purpose and Need for Action

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

The need for the proposed action is established by the BLM's responsibility under the Mineral Leasing Act of 1920, as amended (MLA; 30 U.S. Code [USC] 181 et seq.), which authorizes the BLM to lease public lands for the development of mineral deposits (including oil, gas, and other hydrocarbons) and permit the development of those leases. Per 43 Code of Federal Regulations (CFR) 3160 (Onshore Oil and Gas Operations), the BLM is required to respond to a request for an APD. Additionally, it is the BLM's responsibility under the Federal Land Policy and Management Act of 1976 (FLPMA; 43 USC 1701 et seq.) to respond to a request for a ROW Grant over BLM surface. It is the policy of the BLM, as derived from several laws, including the MLA and FLPMA, to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs.

1.3. Decision to be Made

The BLM-FFO will decide whether or not to issue the four APDs and three ROW Grants associated with the 170H/171H and 172H/173H projects, and if so, under what terms and conditions. Under the National Environmental Policy Act (NEPA; Public Law 91-90, 42 USC 4321 et seq.), the BLM-FFO must determine if there are any significant environmental impacts associated with the proposed action warranting further analysis in an Environmental Impact Statement (EIS). The BLM-FFO Field Manager is the responsible officer who will decide one of the following:

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

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 supports the following BLM policy:

> It is the policy of the BLM to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs, consistent with national objectives of an adequate supply of minerals at reasonable market prices. At the same time, the BLM strives to ensure that mineral development is carried out in a manner that minimizes environmental damage and provides for the rehabilitation of affected lands. (BLM 2003b, 2-2 – 2-3)

Development of energy-related ROWs, such as off-lease well pads and access roads, is one of the primary activities of the BLM-FFO lands program. Such ROWs receive environmental review on a case-by-case basis (BLM 2003b, 2-11).

As required by NEPA, this EA addresses site-specific resources and effects of the proposed action that were not specifically covered within the PRMP/FEIS.

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 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

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

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

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

Under Section 404 of the CWA, the EPA regulates the discharge of dredged or fill material into waters of the U.S., including wetlands. The Section 404 program is administered by the EPA and U.S. Army Corps of Engineers (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.) 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.

170H/171H

The eastern portion of the proposed 170H/171H well pad construction zone (between Corners 1 and 6) would cross one USGS watercourse. In order to avoid the USGS watercourse, the well pad construction zone would not be utilized within this portion of the proposed project area.

172H/173H

The proposed 172H/173H well pad and well pad construction zone would cross one USGS watercourse. During the October 23, 2013, on-site meeting, the USGS watercourse did not appear to have an ordinary high water mark. The BLM-FFO has determined that this USGS watercourse does not appear to have a significant nexus to a traditional navigable water; therefore, this watercourse would not be jurisdictional and a USACE Section 404 permit would not be required for the proposed 172H/173H project.

1.5.2. National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966 (NHPA; 16 USC 470) requires federal agencies to take into account the effects of their actions on historic properties, and allow the Advisory Council on Historic Preservation a reasonable opportunity to comment. Compliance with the requirements of the NHPA is met by following the 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).

1.5.3. Clean Air Act

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

1.5.4. New Mexico State Regulations

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

On-site meetings, attended by WPX, BLM-FFO representatives, and an environmental consultant (Nelson Consulting, Inc. [NCI]), were held at the proposed 170H/171H project area on December 18, 2012, and August 14, 2013. An on-site meeting, attended by WPX, BLM-FFO representatives, and an environmental consultant (NCI), was held at the proposed 172H/173H project area on October 23, 2013. The local chapter of the Navajo Nation was invited to the on-site meetings by the BLM-FFO; no members of the

Navajo Nation attended the meetings. A public invitation to the on-site meetings was posted online (http://www.blm.gov/nm/st/en/fo/Farmington_Field_Office/ffo_oil_and_gas/ffo_onsites.html); no private citizens or groups attended the meetings. A BLM-FFO Interdisciplinary Team meeting was held on November 12, 2013, to discuss the proposed action. At the aforementioned meetings, potential issues of concern were identified by the BLM-FFO and NCI.

Based on the 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 projects impact air resources?
- How would vegetation-clearing, proposed project activities, and final reclamation impact soils?
- Would drilling the proposed wells impact groundwater?
- How would vegetation-clearing, proposed project activities, and final reclamation associated with the proposed projects impact upland vegetation?
- How would vegetation-clearing, proposed project activities, and final reclamation impact wildlife, including migratory birds?
- How would vegetation-clearing, proposed project activities, and final reclamation impact the following BLM Special Status Species (SSS): American peregrine falcon (*Falco peregrinus anatum*), Bendire's thrasher (*Toxostoma bendirei*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), and pinyon jay (*Gymnorhinus cyanocephalus*)?
- How would surface-disturbing activities associated with construction of the proposed projects impact cultural 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.

Surface Water Resources

One unnamed, ephemeral USGS watercourse is located within the eastern portion of the proposed 170H/171H well pad construction zone (between Side 1 and Corner 6) and one unnamed, ephemeral USGS watercourse is located within the proposed 172H/173H well pad and well pad construction zone. As stated in Section 1.5.1 (Clean Water Act), the USGS watercourse within the 170H/171H well pad construction zone would be avoided by the proposed project. In addition, as stated in Section 1.5.1, during the October 23, 2013, on-site meeting, the USGS watercourse did not appear to have an ordinary high water mark. The BLM-FFO has determined that this USGS watercourse would not be a water of the U.S. No other surface waters or erosional features are present within the proposed 170H/171H or 172H/173H project areas.

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

Under Section 7 of the Endangered Species Act of 1973 (ESA; 16 USC 1531-1544), all federal agencies are required to consult with the USFWS or National Marine Fisheries Service if they are proposing an action that may affect listed species or designated habitat. Consultation with the USFWS was conducted as part of the PRMP/FEIS to address the cumulative effects of RMP implementation (Consultation No. 2-22-01-1-389, Appendix M of the PRMP/FEIS). Based on a review of species currently listed by the USFWS as occurring in Rio Arriba County (USFWS 2013), as well as the location of the proposed project areas and habitat within the proposed project areas, the potential does not exist for USFWS-listed species to occur within the proposed project areas. Water for drilling would be obtained from the permitted Turtle Mountain (SJ-960-S-3) and 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 report prepared for the proposed action (La Plata Archaeological Consultants [LAC] Report Nos. 2012-29x [LAC 2013a, BLM Report No. 2013(II)012F], 2012-29x #2 [LAC 2013b], 2013-5nn [LAC 2013c, BLM Report No. 2014(I)033F]), 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 areas. 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.

2. PROPOSED ACTION AND ALTERNATIVE(S)

2.1. Proposed Action

The proposed action is the BLM-FFO approval of four APDs and three ROW Grants associated with WPX's 170H/171H and 172H/173H projects. The proposed projects would include the drilling, production, and final abandonment of four oil and natural gas wells; the construction, use, and reclamation of two associated well pads (with construction zones) and two associated access roads; and the clearing, use, and reclamation of up to five staging areas.

The primary objective of the wells would be to produce oil; however, it is likely that natural gas would be a byproduct.

Commencement of the proposed 170H/171H project is proposed for spring 2014. Commencement of the proposed 172H/173H project is proposed for winter 2014.

Construction plats associated with the proposed projects are provided in Appendix B. Photographs of the proposed project areas are provided in Appendix C.

2.1.1. Location of Proposed Project Areas

Maps of the proposed project areas and staging areas are provided in Appendix A. The proposed project areas are plotted on the Lybrook, New Mexico, 7.5-minute USGS quadrangle maps (Figure A.2) and the 2011 Rio Arriba County National Agriculture Imagery Program aerial photograph (Figure A.3).

The proposed project areas are located within the BLM-FFO management area in Rio Arriba County, New Mexico. The proposed project areas are located on BLM-FFO surface within the San Juan Basin. The proposed project areas are located approximately 42 miles south-southeast of the town of Bloomfield, New Mexico and approximately 12 miles east of the community of Nageezi.

The general region surrounding the proposed project areas is characterized piñon-juniper woodlands along mesa slopes/tops and along rolling hills, sagebrush shrublands within low-lying broad valleys, and sparsely vegetated badlands. Specifically, the proposed project areas are located at approximately 7,000 to 7,040 feet AMSL. The proposed project areas are located on gently rolling terrain, with a very gentle slope to the southeast toward unnamed tributaries of Escrito Canyon.

Existing and proposed oil and gas lease roads, well pads, and pipeline corridors are in the general vicinity of the proposed project areas.

The location description for each of the proposed project areas is provided below.

170H/171H

The proposed 170H/171H project area is approximately 0.8 mile northeast of the U.S. Highway 550 and County Road 378 intersection.

Approximately 970 feet of the proposed 170H/171H access road would overlap an existing two-track road and pipeline right-of-way. The existing two-track road also travels through the central portion of the proposed well pad.

The legal location of the proposed 170H/171H project area and potential staging areas is provided in **Error! Reference source not found.**, below.

Table 1. Legal Land Description for 170H/171H Project Features

Project Feature	Legal Location (New Mexico Principal Meridian)		
	Quarter-Quarter	Section	Township & Range
Well Pad & Construction Zone	northwestern quarter of southwestern quarter	12	Township 23 North, Range 7 West
Access Road	northwestern quarter of southwestern quarter southwestern quarter of northwestern quarter		
Staging Areas			
168H/169H Well Pad	western half of northwestern quarter		
Federal 12 No. 1 Well Pad	northwestern quarter of northwestern quarter		
Mancos Compressor Station	northeastern quarter of northeastern quarter	11	
William's Tank Area	western half of southeastern quarter		

The latitude and longitude of the 170H/171H bottom hole and surface hole locations are provided in Table 2, below.

Table 2. Bottom Hole and Surface Hole Locations for 170H/171H Wells

Wellhead/ Bottom Hole	Geographical Coordinate System (UTM, NAD83 [1])		Legal Land Description (New Mexico Principal Meridian)		
	Latitude	Longitude	Footages [2]	Section	Township & Range
170H					
Wellhead	36.23820	-107.53500	2005 feet FSL 321 feet FWL	12	Township 23 North, Range 7 West
Bottom Hole	36.23925	-107.55255	2224 feet FSL 230 feet FWL	11	
171H					
Wellhead	36.23815	-107.53496	1987 feet FSL 331 feet FWL	12	Township 23 North, Range 7 West
Bottom Hole	36.23418	-107.55232	380 feet FSL 230 feet FWL	11	

[1]UTM: Universal Transverse Mercator, NAD83: North American Datum of 1983
[2]FSL: From South Line, FWL: From West Line

Up to four staging areas could be utilized during the construction phase of the proposed 170H/171H project; these staging areas are listed below.

- WPX's existing 168H/169H well pad: This well pad is located at the northern terminus of the proposed 170H/171H access road.
- Range Production's reclaimed Federal 12 No. 1 well pad: This well pad is located approximately 0.2 mile northeast of the northern terminus of the proposed 170H/171H access road.
- Elm Ridge's Mancos Compressor Station: This compressor station is located along County Road 378, leading to the proposed project area.
- William's Tank Area: This tank area is located along County Road 378, leading to the proposed project area.

172H/173H

The proposed 172H/173H project area is located directly north of U.S. Highway 550, approximately 0.7 mile east-southeast of the U.S. Highway 550 and County Road 378 intersection. The proposed 172H/173H project area is located approximately 0.5 mile south of the proposed 170H/171H project area.

The majority of the approximately 373-foot-long proposed 172H/173H access road would overlap an existing roadway and Enterprise Products Partners L.P. (Enterprise) pipeline working area, which are currently devoid of vegetation. The southern portion of the proposed well pad also overlaps this pipeline working area.

The legal location of the proposed 172H/173H project area and potential staging areas is provided in **Error! Reference source not found.**, below.

Table 3. Legal Land Description for 172H/173H Project Features

Project Feature	Legal Location (New Mexico Principal Meridian)		
	Quarter-Quarter	Section	Township & Range
Well Pad & Construction Zone	western half of northwestern quarter	13	Township 23 North, Range 7 West
Access Road	southwestern quarter of northwestern quarter		
Staging Areas			
174H/175H Well Pad	northwestern half of southwestern quarter	13	
	eastern half of southeastern quarter	14	
Lybrook South No. 3 Well Pad	northeastern quarter of southeastern quarter	14	

The latitude and longitude of the 172H/173H bottom hole and surface hole locations are provided in Table 4, below.

Table 4. Bottom Hole and Surface Hole Locations for 172H/173H Wells

Wellhead/ Bottom Hole	Geographical Coordinate System (UTM, NAD83 [1])		Legal Land Description (New Mexico Principal Meridian)		
	Latitude	Longitude	Footages [2]	Section	Township & Range
172H					
Wellhead	36.22942	-107.53436	1186 feet FNL 474 feet FWL	13	Township 23 North, Range 7 West
Bottom Hole	36.23210	-107.55233	380 feet FNL 230 feet FWL	14	
173H					
Wellhead	36.22937	-107.53433	1205 feet FNL 484 feet FWL	13	Township 23 North, Range 7 West
Bottom Hole	36.22703	-107.55258	2230 feet FNL 230 feet FWL	14	

[1]UTM: Universal Transverse Mercator, NAD83: North American Datum of 1983
[2]FNL: From North Line, FWL: From West Line

Up to one staging area could be utilized during the construction phase of the proposed 172H/173H project; these staging areas are listed below.

- WPX's existing 174H/175H well pad: This well pad is located approximately 0.3 mile south-southwest of the proposed project area.
- Elm Ridge's existing Lybrook South No. 3 well pad: This well pad is located approximately 0.3 mile south-southwest of the proposed project area.

2.1.2. Description of Proposed Projects

For a detailed description of design features and construction practices associated with the proposed projects, refer to the APDs and ROW Grant Applications on file at the BLM-FFO. The plats (Appendix B) provide additional details. WPX would comply with BLM guidance and standards established in *The Gold Book: Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (*Gold Book*; BLM and U.S. Forest Service [USFS] 2007).

Design Features and Best Management Practices

WPX would adhere to the Conditions of Approval (COAs) attached to the approved APDs and stipulations attached to the approved ROW Grants. 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 areas would be maintained in a sanitary condition. Hazardous substances would be handled and disposed of according to federal law.

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 pits would be used for the proposed projects. WPX would utilize a cuttings pit for the proposed 172H/173H project.

Protection of Paleontological Resources

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

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 and stipulations attached to the ROW Grants. These stipulations could include, but would not be limited to, temporary or permanent fencing or other physical barriers, monitoring of earth-disturbing construction, reduction of the proposed project areas and/or establishment of specific construction avoidance zones, and employee education.

Employees, contractors, and sub-contractors associated with the proposed projects 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 ARPA.

In the event of a cultural discovery during construction, WPX would immediately stop all construction activities in the immediate vicinity of the discovery and immediately notify the archaeological monitor, if present, or the BLM. The BLM would then evaluate or cause the site to be evaluated. Should a discovery be evaluated as significant (e.g., eligible for the National Register of Historic Places [NRHP] or protected

under NAGPRA or ARPA), it would be protected in place until mitigating measures could be developed and implemented according to guidelines set by the BLM.

Protection of Flora and Fauna, including SSS and Livestock

Because the proposed projects would each disturb more than 4.0 acres of vegetation, if construction activities for either of the proposed projects would occur during the migratory bird breeding season (May 15 through July 31), a migratory bird nest survey of that proposed project area would take place one to two days prior to construction. This survey would be conducted by a BLM-FFO-approved biologist following BLM-FFO protocol. If, during the nest survey or during construction, active nests are located within or adjacent to the proposed project area, the BLM-FFO biologist would be notified and project activities would not be permitted until fledging has occurred. If postponement is not an option, the operator would contact the USFWS's Migratory Bird Permit Office regarding permitting.

Should any active raptor nests be observed within one-third mile of the proposed project areas or should any SSS be observed within the proposed project areas prior to or during construction, construction would cease and the BLM-FFO would be immediately contacted. The BLM-FFO would then ensure evaluation of the resource. Should a discovery be evaluated as significant (protected under the ESA, etc.), it would be protected in place until mitigation could be developed and implemented according to guidelines set by the BLM.

If SSS (listed by the USFWS or BLM) are observed within the proposed project areas prior to or during project implementation, construction would cease and the BLM-FFO would be notified. Specific SSS mitigation measures would be implemented under the direction of the BLM-FFO.

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

The wells associated with the connected action would each have a closed-loop system. As stated above (Design Features and Best Management Practices - Control of Waste), 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.

Livestock grazing operators in the vicinity of the proposed project areas would be contacted by WPX at least 10 days prior to construction. No holes would be left open overnight. Open holes would be barricaded to ensure the safety of livestock and wildlife. If present, any range improvements (such as fences, gates, cattleguards, or waterlines) disturbed by construction activities would be repaired to the condition they were in prior to disturbance. Repairs, if needed, would take place immediately following construction.

A cattleguard would be installed along the proposed 172H/173H access road where the access road crosses an existing fence line (with an existing gate), just north of U.S. Highway 550.

Protection of Water Resources

The wells associated with the connected action would each have a closed-loop system. As stated above (Design Features and Best Management Practices - Control of Waste), 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.

In order to avoid a USGS watercourse, the eastern portion of the proposed 170H/171H well pad construction zone (between Corners 1 and 6) would not be utilized.

Protection of Topsoil

Topsoil, which would be stripped from the surface of the proposed project areas during the construction phase of the proposed projects, would be stored and protected until it is redistributed during reclamation. Topsoil would be stored within the construction zones separately from subsoil material. The topsoil would

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

Protection of the Public

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

There are several scattered residences within a one-mile radius of the proposed project areas. The closest residence to the proposed 170H/171H project area is approximately 0.5 mile to the south-southwest, and the closest residence to the 172H/173H project area is approximately 0.1 mile to the west. The residences within a one-mile radius of the proposed projects are clustered along U.S. Highway 550, which is south of the proposed project areas. Due to the residences in the proposed Chaco 172H/173H project vicinity, the cuttings pit would be fenced prior to the placement of the liner within the pit.

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 areas throughout the life of the projects. WPX's weed-control contractor would contact the BLM-FFO regarding acceptable weed-control methods. If the contractor does not hold a current Pesticide Use Permit, a Pesticide Use Permit would be submitted prior to pesticide application. Only pesticides authorized for use on BLM lands would be used. The use of pesticides would comply with federal and state laws. Pesticides would be used only in accordance with their registered use and limitations. WPX's weed-control contractor would contact the BLM-FFO prior to using these chemicals.

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.

Noise

As stated above (Design Features and Best Management Practices – Protection of the Public), there are several scattered residences within a one-mile radius of the proposed project areas. 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 and/or stipulations attached to the approved ROW Grants.

Additional Design Features and BMPs

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

No construction or routine maintenance activities would be performed during periods when the soil is too wet to adequately support construction 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 well locations would have an informational sign, as required by Onshore Oil and Gas Operations regulations (43 CFR 3160).

In order to avoid a sensitive environmental resource along the existing two-track road, WPX would re-route the proposed 170H/171H access road around this resource and close the 360-foot-long segment of the existing road. This 360-foot-long segment of the existing road would be closed as outlined in the COAs attached to the approved APDs and stipulations attached to the ROW Grants. In addition, the western corner of the proposed 170H/171H well pad construction zone (near Corner 3) would be reduced to avoid a sensitive environmental resource.

Proposed Project Phases

Under the proposed action, the following phases would occur.

Upgrade of Existing Road

170H/171H
WPX would upgrade the existing road leading to the proposed 170H/171H project area from the start of the proposed access road to County Road 378, unless this road has already been updated as part of WPX's 168H/169H project.

172H/173H
No existing roads would be upgraded for the proposed 172H/173H project.

Construction of Access Roads and Well Pads

The construction phase for the well pads and access roads associated with the proposed projects is expected to be approximately one week per proposed project.

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

The proposed access roads and well pads would be leveled with a D-8 bulldozer to provide space and a level surface for vehicles and equipment. Excavated materials from cuts would be used on fill portions of the locations. Construction would utilize native soil and materials available onsite. If sandstone is needed for surfacing the proposed well pads, the sandstone would be retrieved from a permitted location.

The proposed access roads (resource roads) would be designed and maintained in accordance with the *Gold Book* (BLM and USFS 2007) standards and BLM Manual 9113, Sections 1 and 2 (BLM 2011d and BLM 2011e). The 30-foot-wide road corridors would accommodate clearing, cut-and-fill slopes, and drainage ditches. Within the corridors, there would be a 14-foot-wide running surface and adequate crowning and drainage on both sides. The proposed access roads would be built up 18 to 24 inches following *Gold Book* (BLM and USFS 2007) standards. The roads would be constructed to meet the standards for anticipated traffic flow and all-weather requirements. Surfacing material would be used, if economically viable.

The size of the proposed well pads is slightly larger than typical well pads in the BLM-FFO area because the equipment (such as tanks) associated with the new hydraulic fracturing design requires a larger area.

Within the staging areas, vegetation (if present) would be mown. Topsoil would not be removed and no subsurface disturbance (i.e., leveling) would take place.

Water diversions and silt traps (if needed) would be installed during interim reclamation; please see the "Interim Reclamation" section, below.

170H/171H
The proposed access road would be 1,360 feet long. The maximum road grade would be 8 percent. Within the proposed access road corridor, there would be turnouts, as necessary.

The proposed well pad would measure 300 feet by 500 feet. The associated 50-foot-wide well pad construction zone would surround the pad, with the exception of the no-construction zone being utilized at the eastern end of the proposed well pad (between Side 1 and Corner 6) and a portion of the construction zone being reduced at the western corner of the proposed well pad (near Corner 3). The maximum well pad cut would be 5 feet along the south-central portion of the well pad (between Corners 2 and 3). The maximum fill would be 4 feet on the eastern corner (Corner 6).

The proposed well pad and access road would be cleared of vegetation. The vegetation (including trees less than 3 inches in diameter [at ground level] and slash/brush) would be chipped or mulched and incorporated into the topsoil as additional organic matter. No mature trees larger than 3 inches in diameter (at ground level) are present within the 170H/171H project area.

172H/173H
The proposed access road would be 373 feet long. The maximum road grade would be 4 percent. Within the proposed access road corridor, there would be no turnouts.

The proposed well pad would measure 300 feet by 478 feet. The associated 50-foot-wide well pad construction zone would surround the pad. The maximum well pad cut would be 15 feet on the northern corner (Corner 5). The maximum fill would be 9 feet at laydown (between Corners 2 and 6).

The proposed well pad and access road would be cleared of vegetation. The vegetation (including trees less than 3 inches in diameter [at ground level] and slash/brush) would be chipped or mulched and incorporated into the topsoil as additional organic matter. Trees larger than 3 inches in diameter or greater (at ground level) would be cut to ground level and delimbed. Tree trunks (left whole) and cut limbs would be placed along the access road in a manner that would not create additional disturbance or degrade any reclamation. The subsurface portion of trees (tree stumps) would be placed in adjacent areas needing soil stabilization, or would be hauled to an approved facility.

Drilling and Completion

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

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

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

- Fuel storage
- Dog House (equipment control room)
- Construction trailers
- Various service company equipment (cement trucks, fracturing trucks & equipment, wireline trucks, etc.)

Approximately 10 to 40 personnel would be on the proposed sites at any time during drilling and completion.

During this process, vehicles would use existing access roads, as well as developed roads and highways in the region. Traffic would include light vehicles (such as cars and pick-up trucks) and heavy vehicles (such as water trucks and large tractor-trailers hauling equipment).

It is estimated that 23,000 barrels of useable water would be required to drill each well. Of the 23,000 barrels, approximately 10,000 to 11,000 barrels would be recovered for reuse. Water for drilling would be obtained from the San Juan Basin Water Haulers Association, who would obtain and truck their water from permitted water wells (the Turtle Mountain [SJ-960-S-3] and Blanco Trading Post [WR711] wells). WPX would ensure that water would be obtained legally and that all required permits would be obtained prior to obtaining water.

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

As stated in “Design Features and Best Management Practices – Control of Waste,” above, 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 would be used for the proposed projects. WPX would utilize a cuttings pit for the proposed 172H/173H project. 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 wells prove to be productive, some portions of the proposed project areas would be fully reclaimed and some portions would only be reseeded. Remaining portions would remain disturbed throughout the life of the associated wells. Areas that would be fully reclaimed, reseeded only, or left unreclaimed during this phase are described in Section 2.1.3 (Surface Disturbance). During interim reclamation, WPX would repair any damage to the staging areas. The staging areas would be reseeded during interim reclamation (with the exception of any previously unvegetated portions of the staging areas that the facility operators prefer to remain unseeded). Details of the interim reclamation process (including species included in the seed mixture) are provided in the Surface Reclamation Plans (Appendix D).

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

During this phase, a bulldozer and a tractor with seeding capabilities would be used for reclamation purposes. Approximately four personnel would be required to conduct interim reclamation.

In areas that would be fully reclaimed, slopes would be re-contoured to pre-construction topographical contours, if possible. WPX would diminish the evidence of cuts, fills, and flat well pad surfaces.

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

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

Under the BLM-FFO Bare Soil Reclamation Procedures (BLM 2013b), monitoring reclaimed surfaces is required to document successful reclamation; monitoring and reporting are discussed in the Surface Reclamation Plans (Appendix D).

170H/171H
A silt trap would be placed within the well pad construction zone, north of Corner 3.

172H/173H
Twenty-four-inch-diameter culverts would be installed beneath the proposed 172H/173H access road at approximate stationings 0+21.8 and 3+57.2.

Production

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

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

Production facilities would be located within a 300-by-100-foot facility area on each well pad. The tear drop for each well pad would consist of a looped, 35-foot-wide driving surface; the tear drop would be used to access the 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 one pick-up truck would visit the proposed well pads 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 well pad but would not be used for daily activities.

170H/171H
The facility area is located at the northwestern end of the proposed 170H/171H well pad.

172H/173H
The facility area is located at the southeastern end of the proposed 172H/173H well pad.

Final Reclamation and Abandonment

If the wells prove to be unproductive, or when the wells are no longer commercially viable, the wells 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 would be removed. An aboveground marker would be placed over the plugged holes. The markers would each contain individual well identification information.

Final reclamation of the proposed well pads and access roads would take place, unless the BLM-FFO considers the retention of these facilities necessary for the management of multiple uses of natural resources. Details of the final reclamation process (including species included in the seed mixture) are provided in the Surface Reclamation Plans (Appendix D).

The final reclamation phase is anticipated to take less than one week for each proposed project location. WPX would provide the BLM-FFO with technical and environmental aspects of the final plugging, abandonment, and reclamation procedures.

During this phase, a bulldozer and a tractor with seeding capabilities would be used. Approximately four personnel would be required.

The goal of final reclamation would be to return disturbed areas associated with the proposed projects to pre-construction conditions, if possible, by diminishing the evidence of cuts, fills, and flat surfaces. Portions of the proposed project areas that were not fully reclaimed during interim reclamation would be cleared (if vegetated), re-contoured to pre-construction topographical contours, covered with salvaged topsoil, and seeded. Sediment- and erosion-control measures would be implemented, as necessary. Water bars would be installed across the roads, 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.

Under the BLM-FFO Bare Soil Reclamation Procedures (BLM 2013b), monitoring reclaimed surfaces is required to document successful reclamation; monitoring and reporting are discussed in the Surface Reclamation Plans (Appendix D).

2.1.3. Proposed Surface Disturbance

New surface disturbance associated with the proposed project areas would be 11.3 acres. Of this, 2.7 acres would be reseeded (but not recontoured) and 5.7 acres would be fully reclaimed during interim reclamation. The remainder (2.9 acres) would remain disturbed throughout the life of the projects. In addition, approximately 0.2 acre of a previously disturbed area associated with the proposed 172H/173H access road corridor would be reseeded (but not recontoured). Therefore, the net total of new surface disturbance associated with the proposed projects would be approximately 11.1 acres. Additionally, up to five staging areas would be used for the proposed projects. The individual projects are discussed further below.

170H/171H

Total surface disturbance associated with the proposed 170H/171H access road, well pad, and well pad construction zone would encompass 6.4 acres. Of this, approximately 6.1 acres would be new surface disturbance. Of the 6.1 acres, 1.5 acres would be reseeded (but not recontoured) and 3.0 acres would be fully reclaimed during interim reclamation. The remainder (1.6 acres) would remain disturbed throughout the life of the project. In addition, up to four staging areas would be used for the proposed project. The following table summarizes the disturbance and reclamation acreage associated with the proposed project.

Table 5. Acreage Associated with Proposed Project

Feature	Acreage		Description of Acreage Following Interim Reclamation		
	Total	New Disturbance	Fully Reclaimed (Reseeded and Recontoured)	Reseed Only	Unreclaimed
Surface Disturbance					
Well Pad	3.4	3.4	1.2	1.0 (1)	1.2 (1)
Construction Zone	2.1	1.8	1.8	-	-
Access Road Corridor	0.9	0.9	-	0.5 (1)	0.4 (1)
Total	**6.4**	**6.1**	**3.0**	**1.5 (1)**	**1.6 (1)**
Potential Staging Area (Previously Disturbed Surface)					
168H/169H Well Pad (Active)	4.5	-	-	4.5 (2)	-
Federal 12 No. 1 Well Pad (Reclaimed)	1.8	1.8	-	1.8 (2)	-
Mancos Compressor Station (Active)	3.3	-	-	3.3 (2)	-
William's Tank Area (Active)	1.4	-	-	1.4 (2)	-
Total	**11.0**	**1.8**	**-**	**11.0 (2)**	**-**

(1) These areas would be fully reclaimed during final reclamation
(2)Staging area would be reseeded, unless facility operator prefers that area remain unseeded.

The proposed 170H/171H project features are described further below.

Access Road Corridor

The access road corridor would be 30 feet wide and 1,360 feet long (0.9 acre). Approximately 970 feet would follow an existing two-track road and pipeline ROW.

The 14-foot-wide running surface of the proposed access road and the bottoms of the bar ditches alongside the proposed access road (approximately 0.4 acre, total) would remain disturbed for the lifetime of the proposed project. No reclamation would occur within this area during interim reclamation. The remainder of the proposed access road corridor (0.5 acre) would be reseeded during interim reclamation.

Well Pad

The well pad would measure approximately 300 by 500 feet (3.4 acres).

Of the 3.4 acres of new disturbance, approximately 1.2 acres, known as the "non-reseed working area," would remain disturbed for the lifetime of the proposed project. The non-reseed working area would consist of the following:

- A 300-by-100-foot (0.7-acre) facility area would be located on the northwestern side of the proposed well pad.
- A teardrop with a 35-foot-wide (0.5-acre) driving surface would be located within the center of the proposed well pad.

Of the 3.4 acres of new disturbance, approximately 1.0 acre, known as the "reseed working area," would be reseeded (but not recontoured) during interim reclamation. The reseed working area would consist of the center of the tear drop and an approximately 210-by180-foot workover area around each wellhead.

The remainder of the well pad (1.2 acres) would be fully reclaimed during interim reclamation.

Construction Zone

A 50-foot-wide (2.1-acre) construction zone would surround the well pad. Less than 0.1 acre of the construction zone would overlap the proposed access road. The eastern portion of the proposed construction zone (between Corners 1 and 6) would be reduced by 0.2 acre in order to avoid a USGS watercourse, and the western corner of the proposed construction zone (near Corner 3) would be reduced by 0.1 acre due to resource issues. Therefore, the construction zone would add 1.8 acres of new disturbance to the proposed project area.

The construction zone would be fully reclaimed during interim reclamation.

Staging Area

Up to four staging areas could be used for the proposed project:

- WPX's active 168H/169H well pad measures approximately 4.5 acres; of this, approximately 1.0 acre makes up the working area.
- Range Production's reclaimed Federal 12 No. 1 well pad measures approximately 1.8 acres (based on aerial photographs).
- Elm Ridge's active Mancos Compressor Station measures approximately 3.3 acres; of this, approximately 1.5 acres appears to be unvegetated and active (based on aerial photographs).
- William's Tank Area measures approximately 1.4 acres, all of which appears to be unvegetated and active (based on aerial photographs).

During staging, WPX would stay within the boundaries of the existing disturbance areas. During interim reclamation, WPX would repair any damage to the staging areas. As discussed in Section 2.1.2 (Description of Proposed Projects), the staging areas would be reseeded (but not recontoured) during interim reclamation (with the exception of any previously unvegetated portions of the staging areas that the facility operators prefer to remain unseeded).

172H/173H

Total surface disturbance associated with the proposed 172H/173H access road, well pad, and well pad construction zone would encompass 5.8 acres. Of this, approximately 5.2 acres would be new surface disturbance. Of the 5.2 acres, 1.2 acres would be reseeded (but not recontoured), 2.7 acres would be fully reclaimed during interim reclamation, and 1.3 acres would remain disturbed throughout the life of the project. In addition, approximately 0.2 acre of a previously disturbed area associated with the access road corridor would be reseeded (but not recontoured). Therefore, the net total of new surface disturbance would be approximately 5.0 acres. One staging area would be used for the proposed project. The following table summarizes the disturbance and reclamation acreage associated with the proposed project.

Table 6. Acreage Associated with Proposed Project

Feature	Acreage		Description of Acreage Following Interim Reclamation		
	Total	New Disturbance	Fully Reclaimed (Reseeded and Recontoured)	Reseed Only	Unreclaimed
Surface Disturbance					
Well Pad	3.4	3.3	0.8	1.2 (1)	1.3 (1)
Construction Zone	2.1	1.9	1.9	-	-
Access Road Corridor	0.3	-	-	0.2 (1, 2)	-

Feature	Acreage		Description of Acreage Following Interim Reclamation		
	Total	New Disturbance	Fully Reclaimed (Reseeded and Recontoured)	Reseed Only	Unreclaimed
Surface Disturbance					
Total	**5.8**	**5.2**	**2.7**	**1.4** [1, 2]	**1.3** [1]
Potential Staging Area (Previously Disturbed Surface)					
174H/175H Well Pad (Active)	3.4	-	-	3.4 [3]	-
Lybrook South No. 3 Well Pad (Active)	1.2	-	-	1.2 [3]	-

[1]These areas would be fully reclaimed during final reclamation
[2]Approximately 0.2 acre of existing disturbance would be reseeded.
[3]Staging area would be reseeded, unless facility operator prefers that area remain unseeded. Only one staging area would be utilized for the proposed project.

The proposed 172H/173H project features are described further below.

Access Road Corridor

The access road corridor would be 30 feet wide and 373 feet long (0.3 acre). Much of this access road would overlap an existing roadway and Enterprise pipeline working area, which are currently devoid of vegetation. Therefore, the access road would not add new disturbance to the proposed project area.

The 14-foot-wide running surface of the proposed access road and the bottoms of the bar ditches alongside the proposed access road (approximately 0.1 acre, total) would remain disturbed for the lifetime of the proposed project. No reclamation would occur within this area during interim reclamation. The remainder of the proposed access road corridor (0.2 acre), which overlaps existing disturbance, would be reseeded during interim reclamation.

Well Pad

The well pad would measure approximately 300 by 500 feet (3.4 acres). The southwestern corner of the well pad (0.1 acre) overlaps an Enterprise pipeline working area, which is currently devoid of vegetation. Therefore, the well pad would add 3.3 acres of new disturbance to the proposed project area.

Of the 3.3 acres of new disturbance, approximately 1.3 acres, known as the “non-reseed working area,” would remain disturbed for the lifetime of the proposed project. The non-reseed working area would consist of the following:

- A 300-by-100-foot (0.7-acre) facility area would be located on the southeastern side of the proposed well pad.
- A teardrop with a 35-foot-wide (0.6-acre) driving surface would be located within the center of the proposed well pad.

Of the 3.3 acres of new disturbance, approximately 1.2 acre, known as the “reseed working area,” would be reseeded (but not recontoured) during interim reclamation. The reseed working area would consist of the center of the tear drop and an approximately 210-by180-foot workover area around each wellhead.

The remainder of the well pad (0.8 acre) would be fully reclaimed during interim reclamation.

Construction Zone

A 50-foot-wide (2.1-acre) construction zone would surround the well pad. Less than 0.1 acre of the construction zone would overlap the proposed access road. The southwestern corner of the construction zone (0.2 acre) overlaps an Enterprise pipeline working area, which is currently devoid of vegetation. Therefore, the construction zone would add 1.9 acres of new disturbance to the proposed project area.

The 1.9 acres of new disturbance associated with the construction zone would be fully reclaimed during interim reclamation.

Staging Area

Up to one staging area could be used for the proposed project:

- WPX's active 174H/175H well pad measures approximately 3.4 acres; of this, approximately 1.4 acre makes up the working area.
- Elm Ridge's active Lybrook South No. 3 well pad measures approximately 1.2 acres, all of which appears to be unvegetated and active (based on aerial photographs).

During staging, WPX would stay within the boundaries of the existing disturbance areas. During interim reclamation, WPX would repair any damage to the staging areas. As discussed in Section 2.1.2 (Description of Proposed Projects), the staging areas would be reseeded (but not recontoured) during interim reclamation (with the exception of any previously unvegetated portions of the staging areas that the facility operators prefer to remain unseeded).

2.2. No Action

Under the No Action Alternative, the 170H/171H and 172H/173H APDs and ROW Grants would not be approved. The proposed wells would not be drilled and the proposed well pads and access roads would not be constructed. Current land and resource uses would continue to occur in the proposed project areas.

2.3. Alternatives Considered but Eliminated from Detailed Study

Natural gas and oil wells can be drilled vertically or directionally/horizontally. Vertical drilling places a well pad directly above the bottom hole, while directional/horizontal drilling allows for flexibility in the placement of the well pad and associated surface facilities. Directional/horizontal drilling often allows for "twinning," or drilling two or more wells from one shared well pad. Directional/horizontal drilling applications throughout the San Juan Basin have become relatively routine. Generally, the use of this technology is applied when it is necessary to avoid or minimize impacts to surface resources.

Factors such as reservoir depth, angle of deviation, lateral displacement, completion technique, and risk are considered before deciding on the use of directional drilling applications. In addition, operating factors such as production efficiency; rod, pump, and tubing wear; and workover frequency is also a consideration. Generally, directional well completion and operating costs are 20 to 25 percent higher than vertical well drilling costs. The primary economic factors that determine the feasibility of directional applications include, but are not limited to, incremental drilling, completion, and operating costs; oil and gas reserves; rates of production; oil and gas prices; royalties and taxes; and return on investment.

2.3.1. 170H/171H

No feasible alternative surface locations were identified for the proposed 170H/171H wells that would result in less surface disturbance than the proposed location.

2.3.2. 172H/173H

WPX originally proposed locating the 172H and 173H wellheads on separate well pads. The 172H well pad and access road would have been located within the northwestern quarter of the northwestern quarter of Section 13, Township 23 North, Range 7 West, and the 173H well pad and access road would have been located within the southwestern quarter of the southwestern quarter of Section 13 and the southeastern quarter of the southeastern quarter of Section 14 within Township 23 North, Range 7 West.

The two original well pads were combined into one well pad (the current proposed project) in order to reduce the amount of disturbance. The separate well pads would have resulted in more surface disturbance (i.e., two well pads [approximately 11.0 acres, total] and two access roads [approximately 1.0 acre, total]) than the currently proposed 172H/173H project (approximately 5.2 acres, total).

No additional, feasible surface location alternatives were identified by WPX or the BLM for the proposed project.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Under the No Action alternative, current land and resource issues within the proposed project areas 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 project areas are located in Rio Arriba County, New Mexico. General information on air quality in the area is contained in Chapter 3 of the PRMP/FEIS (BLM 2003a, 3-48 – 3-53). New information about greenhouse gases (GHGs) and their effects on national and global climate conditions has emerged since this document was prepared. Ongoing scientific research has identified the potential impacts of GHG emissions such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide, 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. These changes are 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 the Air Resource Technical Report; BLM 2013a). 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 EPA has the primary responsibility for regulating air quality, including the regulation of 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} & $PM_{2.5}$), sulfur dioxide (SO_2) and lead (Pb). The EPA has established NAAQS for criteria air pollutants. The NAAQS are protective of human health and the environment. The 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, with the exception of tribal lands and Bernalillo County.

Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology, and terrain. Air quality 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. The EPA has proposed or completed actions recently to implement CAA requirements for GHG emissions. Climate has the potential to influence renewable and non-renewable resource management.

Air Quality

Criteria Air Pollutants

The Air Resource Technical Report describes the types of data used in the description of the existing conditions of criteria pollutants, describes 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 (BLM 2013a). The EPA Green Book web page reports that all counties in the BLM-FFO analysis area, including San Juan, McKinley, Rio Arriba, and Sandoval Counties in New Mexico and La Plata County in Colorado, are in attainment of all NAAQS as defined by the CAA (EPA 2012). In addition, the area does not violate any New Mexico Ambient Air Quality Standards (NMAAQS). The current criteria pollutant “design

concentrations" in the analysis area are described below. Design Concentrations are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. Table 7 shows monitored design values for O_3 in recent years for each of the three San Juan County O_3-monitoring stations.

Table 7. Reported Ozone Values for San Juan County Ozone Monitoring Stations

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

Source: NMED 2012
* parts per million

Table 8 summarizes monitored design values for other criteria pollutants in San Juan County.

Table 8. Criteria Pollutant Design Value Concentrations monitored in San Juan County

Pollutant	Design Value	Averaging Time	NAAQS	NMAAQS
NO_2	13 ppb	Annual	53 ppb	50 ppb
NO_2	39 ppb	1-hour	100 ppb(1)	0.10 ppm (24-hour)
PM_{10}	Data incomplete	24-hour	150 µg/m (3,4)	150 µg/m(3,4)
$PM_{2.5}$	4.5µg/m(3)	Annual	12 µg/m(3,5)	60 µg/m(3,4)
$PM_{2.5}$	14µg/m(3)	24-hour	35 µg/m(1,3)	--
SO_2	0.001ppm(7)	Annual	None	0.02 ppm
SO_2	20 ppb(8)	1-hour	75 ppb(6)	None
SO_2	0.008 ppm	24-hour	None	0.10 ppm

Source: EPA 2012
(1) 98th percentile, averaged over 3 years
(2) Not to be exceeded more than once per year
(3) Not to be exceeded more than once per year on average over 3 years
(4) The NMAAQS is a standard for total suspended particulate matter
(5) Annual mean, averaged over 3 years
(6) 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
(7) ppm: parts per million
(8) ppb: parts per billion

In 2005, the EPA estimated that there was less than 0.01 ton per square mile of Pb emitted in the analysis area, which is less than 2 tons total (BLM 2013a). No monitoring is conducted for Pb and CO in northwestern New Mexico; however, concentrations of these pollutants are expected to be low in rural areas, and are therefore not monitored.

Hazardous Air Pollutants

The Air 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 2013a). The EPA has identified 187 toxic air pollutants as HAPs. In March 2011, the EPA published the fourth in a series of National Scale Air Toxics Assessments (NATA) that quantifies HAP emissions for 2005 by U.S. county. The purpose of the NATA is to identify areas where HAP emissions result in high health risk. Computer models are used to develop estimates of risk of cancer or other health impacts. NATA presents risk hazard indexes for cancer, neurological problems, and respiratory problems for each county and census tract. Because techniques have changed over the years, each NATA is not comparable to those previously issued. The EPA also cautions that because data availability varies from state to state, the results are not necessarily comparable from one geographic area to another. The 2005 NATA analysis estimated tract level total cancer risk for the analysis area as 25 to 50 per one million; the estimated tract level total respiratory hazard index was zero to 1. The EPA estimates the average national cancer risk for 2005 was 50 per one million, meaning 1 person out of every 20,000 had an increased

likelihood of contracting cancer from breathing air toxics from outdoor sources if exposed to 2005 emission levels over their lifetime. A respiratory hazard index below 1 indicates that exposures in the area do not exceed reference levels that would have adverse effects for human health.

Climate

The analysis area is located in a semiarid climate regime typified by dry, windy conditions and limited rainfall. Summer maximum temperatures are generally in the range of 80 or 90 degrees Fahrenheit (°F), and winter minimum temperatures are generally in the teens to 20s. Temperatures occasionally reach above 100°F in June and July and have dipped below zero in December and January. Precipitation is divided between summer thunderstorms associated with the southwest monsoon and winter snowfall as Pacific weather systems drop south into New Mexico. Table 9 shows climate normals for the 30-year period from 1981 to 2010 for the Farmington, New Mexico, area.

Table 9. Climate Normals for the Farmington Area, 1981-2010

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

Source: BLM 2013a; data collected at New Mexico State Agricultural Science Center - Farmington
(1) degrees Fahrenheit

3.1.2. Impacts from the Proposed Action

Methodology and assumptions for calculating air pollutant and GHG emissions are described in the Air Resources Technical Report. This document incorporates the sections discussing the modification of calculators developed by the BLM to address emissions for one horizontal oil well. The calculators give an approximation of criteria pollutant, HAP, and GHG emissions to be compared to regional and national emissions levels. Also incorporated into this document are sections describing the assumptions used in developing the inputs for the calculator (BLM 2013a).

Direct and Indirect Impacts

Table 10 shows estimated emissions from one proposed horizontal oil well for criteria pollutants, volatile organic compounds (VOCs) and GHGs. For comparison, Table 11 shows total human-caused emissions for each of the counties in the BLM-FFO management area and La Plata County, Colorado, based on the EPA's 2008 emissions inventory (EPA 2011).

Table 10. Criteria Pollutant and VOC Emissions Estimated for Construction of One Horizontal Oil Well; Average 25 Days to Drill and Complete

Activity	NOx[1]	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2
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**

[1]nitrogen oxide

Table 11. Analysis Area Emissions in Tons per Year, 2008

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

Source: EPA 2008

Oil storage tanks on the well locations may result in venting of VOCs. Oil well production is generally presented as barrels per day produced. The emissions calculator estimated that for every barrel per day produced there could be 0.12 tons of VOC vented per year. The average horizontal oil well in the BLM-FFO management 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 12 displays the percent increase in total emissions expected in the analysis area as a result of constructing and operating one horizontal oil well.

Table 12. Percent Increase in Analysis Area Emissions from the Proposed Action

	NO_X	CO	VOC	PM_{10} [1]	$PM_{2.5}$ [1]	SO_2 [1]
Total Emissions	57,303.4	147,078.1	160,079.0	218,800.3	23,897.3	13,343.3
Horizontal Oil Well Emissions	6.13	1.64	12.55(8)	2.54	0.29	0.11
Percent Increase	**0.01**	**0.001**	**0.009**	**0.001**	**0.001**	**0.0008**

[1]Values derived from average emissions for any well drilling in the analysis area. Calculated results available upon request.

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

Total Greenhouse Gases

The available statewide GHG summary combines GHG emissions from CO_2 and CH_4 (NMED 2010). To compare the GHG emissions from the proposed action (estimated by the calculator) with statewide GHG emissions, equivalent CO_{2e} emissions for both CH_4 and CO_2 were summed. The total statewide GHG emission estimate for 2007 was 76,200,000 metric tons of CO_{2e} (76.2 million metric tons; NMED 2010). The estimated CO_{2e} metric tons emissions from one horizontal oil well (609.2 metric tons) would represent a 0.0008-percent increase in New Mexico CO_2 emissions.

Cumulative Impacts

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

The primary sources/activities that contribute to levels of air pollutants and GHG emissions in the Four Corners area are electricity-generation stations, fossil fuel industries, and vehicle travel. The Air Resources 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 2013a). It includes a summary of emissions on the national and regional scale by industry source. Sources/activities 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 action 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 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 (BLM 2013a). It is currently not feasible to know with certainty the net impacts from particular emissions associated with activities on public lands.

3.2. Soil Resources

3.2.1. Affected Environment

Soils in the San Juan Basin were formed primarily from two kinds of parent material: alluvial sediment and sedimentary rock. The alluvial sediment is material that was deposited in river valleys and on mesas, plateaus, and ancient river terraces. This material has been mixed and sorted in transport and has a wide

range of mineralogy and particle size. The parent material of sedimentary rock consists mainly of sandstone and shale bedrock. These shale and resistant sandstone beds form prominent structural benches, buttes, and mesas bounded by cliffs.

The Natural Resources Conservation Service (NRCS) mapped the soils in the proposed project areas. Complete soil information is available in the NRCS's *Soil Survey of Rio Arriba County, New Mexico: Parts of Rio Arriba and Sandoval Counties*. Within the proposed project areas and staging areas, four soil map units are present; these units are described further below.

Table 13. Soil Map Units within the Proposed Project Areas

Map Unit Name (Composition %) *	Slope (%)	Potential for Erosion		Depth to Water Table	Available Water Capacity (inches)	Location within Proposed Action Area
		Water	Wind			
Orlie fine sandy loam	1 – 8	Moderate	Moderate	Very Deep	10.7	• 170H/171H access road • 168H/169H staging area • Federal 12 No. 1 staging area • Mancos Compressor Station staging area
Pinavetes (50) – Florita (40) Complex	2 – 10	Low	Very High	Very Deep	3.6 – 6.9	172H/173H well pad
Sparank (55) – San Mateo (30) silt loams, saline, sodic	0 – 3	Low – Moderate	Moderate	Very Deep	6.5 – 9.0	• 170H/171H well pad • 172H/173H access road • Lybrook South No. 3 staging area • William's Tank Area staging area
Vessilla (45) – Menefee (25) – Orlie (20) complex	1 – 30	Moderate – High	Low – High	Shallow – Very Deep	2.0 – 10.9	• 170H/171H access road • 172H/173H access road and well pad • 174H/175H staging area

Source: NRCS 2008
* Composition percent is provided for map units classified as a complex or an association

Orlie fine sandy loam

The parent material of this soil type primarily consists of fan alluvium and/or slope alluvium derived from sandstone and shale. Orlie fine sandy loam is typically found along mesa and fan remnant landforms. The potential plant community for this soil type is usually comprised of western wheatgrass (*Pascopyrum smithii*), Indian ricegrass (*Achnatherum hymenoides*), needleandthread (*Hesperostipa comata*), James' galleta (*Pleuraphis jamesii*), big sagebrush (*Artemisia tridentata*), and fourwing saltbush (*Atriplex canescens*; NRCS 2008).

Pinavetes-Florita complex

The parent material of this soil complex primarily consists of eolian deposits derived from sandstone. This soil type is typically found along dune and hilly landforms, with a potential plant community usually comprised of western wheatgrass, James' galleta, muttongrass (*Poa fendleriana*), bluestem (*Andropogon* spp.), Indian ricegrass, sand sagebrush (*Artemisia filifolia*), piñon pine (*Pinus edulis*), and oneseed juniper (*Juniperus monosperma*; NRCS 2008).

Sparank-San Mateo silt loams, saline, sodic

The parent material of this soil map unit primarily consists of stream alluvium derived from sandstone and shale. This soil complex is typically found along floodplain landforms and within salty bottomland ecological sites. The potential plant community for this map unit is usually comprised of alkali sacaton (*Sporobolus airoides*), western wheatgrass, squirreltail (*Elymus elymoides*), James' galleta, fourwing saltbush, and greasewood (*Sarcobatus vermiculatus*; NRCS 2008).

Vessila-Menfee-Orlie complex

The parent material for this soil complex primarily consists of slope alluvium over residuum weather from sandstone and shale and colluvium over residuum weathered from shale. This soil type is typically found along break, summit, and mesa landforms. The potential plant community for this soil complex is usually comprised of western wheatgrass, James' galleta, Indian ricegrass, needleandthread, blue grama (*Bouteloua gracilis*), big sagebrush, fourwing saltbush, piñon pine, oneseed juniper, and Gambel oak (*Quercus gambellii*; NRCS 2008).

3.2.2. Impacts from the Proposed Action

Direct and Indirect Impacts

Within the proposed well pads/construction zones and access road corridors (11.3 acres, total), vegetation would be cleared, topsoil would be stripped, and the location would be leveled. Approximately 2.9 acres would remain as bare, compacted surface for the life of the proposed projects; the remainder (8.4 acres, total) would be reseeded during interim reclamation. In addition, approximately 0.2 acre of a previously disturbed area associated with the proposed 172H/173H access road corridor would be reseeded (but not recontoured) during interim reclamation.

Within the potential staging areas (15.6 acres, total), vegetation (if present) would be cleared. During interim reclamation, WPX would repair any damage to the staging areas. As discussed in Section 2.1.2 (Description of Proposed Projects), the staging areas would be reseeded during interim reclamation (with the exception of any previously unvegetated portions of the staging areas that the facility operators prefer to remain unseeded).

Soils in the proposed project areas and staging areas are classified as having a low to high water erosion potential and a low to very high wind erosion potential (NRCS 2008). The clearing of vegetation within the proposed project areas and staging areas would result in the exposure of soils to water, wind, and direct human disturbances; erosion in these areas would potentially increase. Construction activities within the proposed well pads/construction zones and access road corridors would result in the mixing, displacement, and compaction of soils. The degree of erosion would be dependent upon precipitation and wind. Following construction, the compaction of soils, reclamation of portions of the proposed project areas, and implementation of erosion-control measures would limit soil impacts due to erosion.

Cumulative Impacts

The spatial analysis area for cumulative soil impacts is the proposed project areas and staging areas, immediately surrounding lands, and points immediately downstream. The staging areas have already been disturbed.

The proposed projects would contribute to ongoing soil erosion (associated with the previously disturbed staging areas) within and immediately downstream of the spatial analysis area.

3.3. Groundwater Resources

3.3.1. Affected Environment

Within a 1-mile radius of the proposed well pads, there is one recorded water well. This well does not have a recorded depth-to-water (New Mexico Office of the State Engineer 2011). Therefore, the depth to groundwater in the vicinity of the proposed project areas is unknown.

3.3.2. Impacts from the Proposed Action

Direct and Indirect Impacts

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

Fracking is a common process in the San Juan Basin and applied to nearly all wells drilled. The producing zone targeted by the proposed project 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, which is located above both the Mancos Shale and Mesaverde formations. The Lewis Shale formation provides an impermeable layer that isolates the Mancos Shale and Mesaverde formations from both identified sources of drinking water and surface water. On average, the total depth of the proposed well bores would be about 5,000 feet below the ground surface. Fracking in the Basin Mancos formation is not expected to occur above depths of 4,000 feet below the ground surface. Fracking 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 relatively high levels of total dissolved solids. No impacts to surface water or freshwater-bearing groundwater aquifers are expected to occur from fracking of the proposed wells.

Cumulative Impacts

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

3.4. Upland Vegetation

3.4.1. Affected Environment

The proposed project areas are located within the Arizona/New Mexico Plateau ecological region. This ecological region occurs primarily in Arizona, Colorado, and New Mexico; a small portion is located within Nevada. This ecological region encompasses approximately 45,870,500 acres (185,632 square kilometers), and the elevation ranges from 2,165 to 11,949 feet AMSL. The ecological region's landscapes include low mountains, hills, mesas, foothills, irregular plains, alkaline basins, some sand dunes, and wetlands. This ecological region is a large transitional region between the semiarid grasslands to the east; the drier shrublands and woodlands to the north; and the lower, hotter, less-vegetated areas to the west and south. Vegetation communities include shrublands with big sagebrush,

rabbitbrush, winterfat, shadscale saltbush, and greasewood; and grasslands of blue grama, western wheatgrass, green needlegrass (*Nassella viridula*), and needleandthread grass. Higher elevations may support piñon pine and juniper woodlands. This ecological region includes the urban areas of Santa Fe and Albuquerque, New Mexico. Important land uses within this ecological region include irrigated farming, recreation, rangeland, wildlife habitat, and some natural gas production (Griffith, et al. 2006).

The general region surrounding the proposed project areas is characterized by sagebrush shrublands within valleys, piñon-juniper woodlands along gently rolling hills and mesa slopes/tops, and sparsely vegetated badlands. The proposed project areas overlap two vegetation communities: piñon-juniper woodlands and sagebrush shrublands. The proposed project areas are described further below.

170H/171H

Specifically, the proposed 170H/171H project area overlaps one vegetation community: sagebrush shrublands. The dominant plant species within this community consist of big sagebrush, James' galleta, and blue grama. Other plant species identified within the sagebrush shrubland include oneseed juniper, broom snakeweed (*Gutierrezia sarothrae*), plains pricklypear (*Opuntia polyacantha*), purple threeawn (*Aristida purpurea*), alkali sacaton, Indian ricegrass, goosefoot (*Chenopodium* sp.), buckwheat (*Eriogonum* sp.), Russian thistle (*Salsola tragus*), woolly plantain (*Plantago patagonica*), and scarlet globemallow (*Sphaeralcea coccinea*).

172H/173H

Specifically, the proposed 172H/173H project area overlaps two vegetation communities: piñon-juniper woodlands and sagebrush shrublands.

The southern portion of the proposed project area, which is lower in elevation, is characterized by sagebrush shrublands. This vegetation community is dominated by big sagebrush and blue grama. Other plant species observed within this community consist of broom snakeweed, plains pricklypear, scarlet globemallow, spreading buckwheat (*Eriogonum effusum*), Russian thistle, and winterfat (*Krascheninnikovia lanata*).

The remainder of the proposed project area is characterized by piñon-juniper woodlands. The dominant plant species include oneseed juniper, piñon pine, and big sagebrush. Other plant species identified within this community consist of the ones listed for the sagebrush shrubland vegetation community in addition to banana yucca (*Yucca baccata*), Jerusalem oak goosefoot (*Chenopodium botrys*), and sandmat (*Chamaesyce* sp.).

Additionally, the access road and southwestern portion of the proposed well pad overlap previously disturbed surface associated with an existing roadway and Enterprise pipeline working area. These areas are devoid of vegetation.

3.4.2. Impacts from the Proposed Action

Direct and Indirect Impacts

The proposed projects would result in the removal of approximately 11.3 acres of sagebrush shrubland and piñon-juniper woodland vegetation within the proposed well pads/construction zones and access road corridors. Within the staging areas (approximately 15.6 acres, total), any vegetation removed would mainly consist of reseed species.

During the construction phase of the proposed projects, all vegetation within the proposed project areas and up to five staging areas would be cleared.

During interim reclamation, approximately 5.7 acres of the proposed project areas would be fully reclaimed (recontoured and reseeded). Approximately 2.7 acres within the proposed project areas and up to 15.6 acres of the staging areas would only be reseeded. The remaining 2.9 acres of the proposed project areas would remain as compacted, barren surface for the life of the proposed wells. In addition,

approximately 0.2 acre of a previously disturbed area associated with the proposed 172H/173H access road corridor would be reseeded (but not recontoured).

During final reclamation, WPX would fully reclaim all portions of the proposed project areas that were not fully reclaimed (recontoured and reseeded) during interim reclamation. This would include clearing the vegetation from within the 2.9-acre portion of the well pads and access roads that were only reseeded (not recontoured) during interim reclamation.

During interim and final reclamation, the BLM Sagebrush-Grass Community Seed Mixture would be utilized; the species included in this mixture are listed in the Surface Reclamation Plans (Appendix D). Re-established vegetation would consist of native grass, forb, and shrub species included in the seed mixture, as well as native species that are not deliberately planted. It is also possible that invasive, non-native species could become established within the proposed project areas, as such species could be transported by project equipment and tend to thrive in disturbed areas. Following the reclamation process, the resulting vegetation communities could differ from the native plant communities surrounding the proposed project area. Within reclaimed areas, it is not expected that the vegetation communities would return to native conditions within 20 years (BLM 2003a, 4-18).

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

Cumulative Impacts

The spatial analysis area is the proposed project areas, staging areas, and immediately adjacent lands.

The staging areas have already been disturbed.

Within the remainder of the spatial analysis area, the following vegetative disturbances have occurred or are anticipated to occur in the reasonably foreseeable future:

- Approximately 970 feet of the proposed 170H/171H access road overlaps an existing two-track road and pipeline ROW. The existing two-track road also travels through the central portion of the proposed well pad.
- The start of the proposed 170H/171H access road is at WPX's newly constructed 168H/169H well pad and access road.
- The majority of the 373-foot-long proposed 172H/173H access road overlaps an existing roadway and Enterprise pipeline working area, which is currently devoid of vegetation.
- The southern terminus of the proposed 172H/173H access road is at U.S. Highway 550.
- The southwestern corner of the proposed 172H/173H well pad overlaps the aforementioned Enterprise pipeline working area.
- Active wildlife and livestock grazing occurs in the area. The proposed project areas are within a BLM-FFO grazing allotment (Rancho Largo, Allotment No. 5119) that is permitted for grazing by 300 head of cattle.

Indirectly, fugitive dust or deposition associated with existing roads and well pads in the immediate area could impact the vegetation within the analysis area, and could continue to do so throughout the life of the projects. Aside from those discussed, no additional impacts to vegetation are expected within the analysis area for the reasonably foreseeable future.

The proposed projects would contribute to direct vegetation disturbance and fugitive dust and/or deposition within the spatial analysis area.

3.5. Wildlife

3.5.1. Affected Environment

Migratory Birds

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

- USFWS Birds of Conservation Concern
- New Mexico Partners in Flight New Mexico Bird Conservation Plan
- Comprehensive Wildlife Conservation Strategy for New Mexico
- Gray Vireo Recovery Plan
- The North American Waterbird Conservation Plan
- Recovery plans and conservation plans/strategies prepared for federally-listed candidate species

The selected species have a known distribution in the BLM-FFO area and may be affected by various types of perturbations. The species with the potential to occur in the project areas and brief assessment of their habitat are identified in Table 14**Error! Reference source not found.**.

Table 14. Migratory Birds with Potential to Occur in the Project Areas

Species Name	Habitat Associations
Bendire's thrasher (*Toxostoma bendirei*)	On the Colorado Plateau, inhabits open sagebrush with scattered junipers; sparse or degraded understory, lower elevations. Avoids riparian areas and arroyos with dense shrub cover
Brewer's sparrow (*Spizella breweri*)	Closely associated with sagebrush, preferring dense stands broken up with grassy areas.
Gray vireo (*Vireo vicinior*)	In northern NM, stands of piñon pine and Utah juniper 5,800 – 7,200 feet AMSL open with a shrub component and mostly bare ground; antelope bitterbrush, mountain mahogany, Utah serviceberry and big sagebrush often present. Broad, flat or gently sloped canyons, in areas with rock outcroppings, or near ridge-tops.
Loggerhead shrike (*Lanius ludovicianus*)	Open country interspersed with improved pastures, grasslands, and hayfields. Nests in sagebrush areas, desert scrub, and woodland edges.
Mountain bluebird (*Sialia currucoides*)	Open piñon-juniper woodlands, mountain meadows, and sagebrush shrublands; requires larger trees and snags for cavity nesting.
Mourning dove (*Zenaida macroura*)	Open country, scattered trees, and woodland edges. Feeds on ground in grasslands and agricultural fields. Roost in woodlands in the winter. Nests in trees or on ground.
Sage sparrow (*Amphispiza belli*)	Large and contiguous areas of tall and dense sagebrush. Negatively associated with seral mosaics and patchy shrublands and abundance of greasewood.
Sage thrasher (*Oreoscoptes montanus*)	Shrub-steppe dominated by big sagebrush.
Vesper sparrow (*Pooecetes gramineus*)	Dry montane meadows, grasslands, prairie, and sagebrush steppe with grass component; nests on ground at base of grass clumps.

Based on habitat and range, the potential exists for numerous migratory birds to occur within the proposed project areas. The following bird species were identified during the site surveys of the proposed project areas:

- American crow (*Corvus brachyrhynchos*)
- Dark-eyed junco (*Junco hyemalis*)
- Northern flicker (*Colaptes auratus*)
- Juniper titmouse (*Baeolophus rodgwayi*)
- Chickadee (*Poecile* sp.)
- Sparrow (Family Passeridae)

General Wildlife

The vegetation communities found within the proposed project areas provide habitat for a variety of vertebrate and invertebrate species. The objectives of the BLM wildlife management program are to "ensure optimum populations and a natural abundance and diversity of fish and wildlife values by restoring, maintaining, and enhancing habitat conditions for consumptive and non-consumptive uses" (BLM 2003b, 2-24). The proposed project areas are dominated by Wyoming big sagebrush with stringers of piñon pine and Utah juniper. It receives year-long use by mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), and lesser small mammals. Its significance to the overall Lybrook/Upper Largo ecosystem is that it represents a metapopulation with respect to mule deer and elk. .

Prior to the site surveys of the proposed project areas, no prairie dog colonies had been recorded within or adjacent to the proposed project areas (BLM 2012b); the closest recorded colony is approximately 10 to 11 miles north-northeast of the proposed project areas. No prairie dogs or their signs were observed during the surveys of the proposed project areas.

The following terrestrial wildlife species were identified during the site surveys of the proposed project areas:

- Mule deer (*Odocoileus hemionus*)
- Desert cottontail (*Cylvilagus audubonii*)
- Black-tailed jackrabbit (*Lepus californicus*)
- Packrats (*Neotoma* sp.)

3.5.2. Impacts from the Proposed Action

Direct and Indirect Impacts

During the construction phase of the proposed projects, all vegetation within the proposed project areas, including approximately 36 to 46 trees (6 trees within 170H/171H project area and 30 to 40 trees within 172H/173H project area), would be cleared. The proposed projects would result in the removal of approximately 11.3 acres of sagebrush shrublands and piñon-juniper woodlands. The proposed project areas would be converted to a reseed community following interim reclamation and final reclamation. The impacts to the vegetation communities are described in detail in Section 3.4 (Upland Vegetation).

There is available, similar habitat in the surrounding area that wildlife could utilize. However, the clearing of vegetation would remove potential habitat. The transformation of the proposed project areas to a reseed community could remove potential habitat for numerous wildlife species, including the priority bird species listed in Table 14, above.

For the long term, occasional human and vehicle presence within the vicinity of the proposed project areas and staging areas would increase above present levels. Additional well equipment could also cause increased noise levels in the vicinity. Audial and visual disturbances associated with the projects could

cause indirect habitat loss by deterring wildlife from using available habitat adjacent to the proposed project areas.

Displacing these animals will add competition for food, water and space in other areas already occupied.

As described in Sections 2.1 (Proposed Action) and 3.4 (Upland Vegetation), approximately 1,360 feet of new access road would be constructed for the proposed projects. Although the proposed access roads partially overlap existing roads, the existing roads are not currently heavily used; following the commencement of the proposed projects, vehicular traffic and human activity would increase in the area. Therefore, the proposed projects would result in habitat fragmentation.

If interim and final reclamation are successful, sagebrush shrubland and piñon-juniper woodland communities would become re-established within the proposed project areas. However, as discussed in Section 3.4 (Upland Vegetation), the re-establishment of a mature, native plant community could require decades, and it is possible that the plant community could never fully recover from disturbance (BLM 2003a, 4-18).

Migratory Birds

Due to the mobility of adult birds, they would be unlikely to be directly harmed by the proposed projects. As discussed in Section 2.1.2 (Description of Proposed Project - Protection of Flora and Fauna, Including SSS and Livestock), if the vegetation-clearing phase of construction is scheduled to occur during migratory bird breeding season, a pre-construction migratory bird nest survey would be conducted within the associated proposed project area. Therefore, it is unlikely that nests, eggs, or young birds within the proposed project areas would be directly harmed. If project activities occur during migratory bird breeding season, birds nesting outside of but near the proposed project areas could abandon existing nests as a result of visual and audial disturbances.

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

General Wildlife

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

Cumulative Impacts

The spatial analysis area includes the proposed project areas, staging areas, and an approximately 1-mile radius around the proposed well pads. Within a 1-mile radius of the proposed well pads, there is existing and proposed disturbance, and the region has been fragmented. Existing and reasonably foreseeable future disturbances within a 1-mile radius of the proposed well pads includes the following:

- 14 active oil or gas well pads
- 7 plugged oil and gas well pads
- Approximately 15 miles of BLM Roads
- Approximately 2 miles of County Road 378

- Approximately 2 miles of U.S. Highway 550
- Several utility ROWs
- Livestock and wildlife grazing
- Residential development

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

3.6. Special Status Species

3.6.1. 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 areas. These species, their habitat descriptions, and their potential to occur within the proposed project areas are provided in the table below.

Table 15. BLM SSS with Potential to Occur within Proposed Project Areas

Species	Status	Documented Occurrence Within BLM-FFO Region	Habitat	Potential to Occur in Proposed Project Areas (PPAs)
BIRDS				
American peregrine falcon (*Falco peregrinus anatum*)	SMS	Summer/ breeding range (Sibley 2000). Known to nest in BLM-FFO (BLM 2003a).	Rugged, semi-open to wooded areas in montane regions. Areas with rocky cliffs, outcrops, and canyons that are at least 30 feet high and often near water. In New Mexico, typically nests on cliff ledges (New Mexico Partners in Flight [NMPIF] 2007, Wheeler 2003).	POSSIBLE: Potential foraging habitat present within PPAs. No suitable nesting habitat within or adjacent to PPAs.

Species	Status	Documented Occurrence Within BLM-FFO Region	Habitat	Potential to Occur in Proposed Project Areas (PPAs)
Bendire's thrasher (*Toxostoma bendirei*)	Sensitive	Summer range (Sibley 2000). Known to occur within BLM-FFO (BLM 2011a).	Sparse desert shrublands, degraded grasslands, and open woodlands with scattered shrubs. On the Colorado Plateau, open sagebrush shrublands with scattered junipers. Avoids riparian areas and arroyos with dense shrub cover (NMPIF 2007).	POSSIBLE: Sagebrush shrublands and piñon-juniper woodlands within PPAs could be utilized for foraging and nesting Bendire's thrashers.
Ferruginous hawk (*Buteo regalis*)	SMS	Year-round range (NMPIF 2007). Known to nest in BLM-FFO (BLM 2012c).	Open areas with broad expanses of prairie grassland or shrub-steppe vegetation, areas with low to moderate agricultural coverage, transitional edges between grasslands and piñon-juniper woodlands, sagebrush shrublands, and desert scrub (NMPIF 2007, NatureServe 2012). Nests in elevated locations on the ground (if in grasslands), in isolated tree stands, on rock outcrops/spires, or on utility poles (NMPIF 2007).	POSSIBLE: Potential foraging habitat present within PPAs. No suitable nesting habitat within or adjacent to PPAs.
Golden eagle (*Aquila chrysaetos*)	SMS	Year-round range (Sibley 2000). Known to nest in BLM-FFO (BLM 2012c).	Open to semi-open country with elevated perches, including grasslands, prairies, open woodlands, shrublands, and barren areas. Prefers hilly or montane regions. Nests on rock ledges on cliffs or in large trees (NatureServe 2012, NMPIF 2007, Wheeler 2003).	POSSIBLE: Potential foraging habitat present within PPAs. No suitable nesting habitat within or adjacent to PPAs.
Pinyon jay (*Gymnorhinus cyanocephalus*)	Sensitive	Year-round range (Sibley 2000). Known to occur within BLM-FFO (BLM 2011a).	Piñon-juniper woodlands. Occasionally areas dominated by ponderosa pine, sagebrush, or chapparal (NMPIF 2007).	POSSIBLE: Piñon-juniper woodlands within 172H/173H PPA could be utilized for foraging and nesting by pinyon jays. Sagebrush shrublands within both PPAs could be utilized for foraging pinyon jays.

No signs of BLM SSS were observed during the site surveys of the proposed project areas. There are no recorded BLM SSS raptor nests in the vicinity of the proposed project areas. The closest recorded raptor nest (an American peregrine falcon nest) is approximately 10 to 11 miles north-northwest of the proposed project areas (BLM 2012c).

Five BLM SSS (American peregrine falcon, Bendire's thrasher, ferruginous hawk, golden eagle, and pinyon jay) have the potential to occur within the proposed project areas; these species are discussed in detail below.

American Peregrine Falcon

American peregrine falcons may be found in the San Juan Basin during the breeding season (Sibley 2000). Generally, peregrine falcons inhabit open areas, such as steppe, mountains, open forests, and human population centers (NatureServe 2012). During the summer, in the interior U.S., this species can often be found in rugged, semi-open to wooded areas in montane regions. The preferred nesting habitat for this falcon species consists of ledges or holes along rocky cliffs, rock outcrops, and canyons (greater than 30 feet high) adjacent to lakes, rivers, and/or streams. Peregrine falcons will also nest in open bogs, tree hollows, and man-made structures in close proximity to water. In the San Juan Basin, nests are typically found on ledges of vertical rocky cliffs (NatureServe 2012, Wheeler 2003).

The sagebrush shrublands and piñon-juniper woodlands found within the proposed project areas could provide foraging habitat for peregrine falcons. Appropriate nesting habitat is not present within or adjacent to the proposed project areas. The nearest recorded peregrine falcon nest is approximately 10 to 11 miles north-northwest of the proposed project areas (BLM 2012c). No peregrine falcons were observed during the site surveys of the proposed project areas.

Bendire's Thrasher

The Bendire's thrasher occurs in New Mexico during the summer/breeding season. In New Mexico, the thrasher breeds in scattered locations within the central and western portions of the state. This species typically inhabits sparse desert shrublands and degraded grasslands. It may also be found in open woodlands with scattered shrubs. On the Colorado Plateau, this species can be found in sagebrush shrublands with scattered junipers. It may also use vegetation around human habitation and agricultural areas (NMPIF 2007). The Bendire's thrasher does not use areas with dense vegetation, such as riparian woodlands, although it may use the edges of such habitats. Nests are placed in low trees, shrubs, or cacti; nests are usually 3 to 5 feet off of the ground, but could be less than 2 feet to more than 11 feet off of the ground (NatureServe 2012).

The sagebrush shrublands and piñon-juniper woodlands found within the proposed project areas could be used by the Bendire's thrasher for breeding and foraging. Appropriate nesting shrubs and small trees are found within the proposed project areas. No Bendire's thrashers were observed during the site surveys of the proposed project areas.

Ferruginous Hawk

Ferruginous hawks may occur in the BLM-FFO region year-round. These hawks occur in open areas with broad expanses of prairie grassland or shrub-steppe vegetation. Ferruginous hawks use areas with low to moderate (less than 50-percent) agricultural coverage. Transitional edge habitats between grasslands and juniper savannah or piñon-juniper woodland are also used (NMPIF 2007). Sagebrush and desert scrub may also be used by ferruginous hawks (NatureServe 2012). The terrain within ferruginous hawk habitat can vary between flatlands, gently rolling hills, large hills, and badlands. The preferred habitat for this hawk species usually includes trees, buttes, large boulders, or rock spires (Wheeler 2003). Ferruginous hawks typically avoid high elevations, forest interiors, narrow canyons, and areas with intensive agriculture or human activity (NatureServe 2012, NMPIF 2007). In New Mexico, nesting typically occurs in isolated tree stands, rock spires, or on rock outcrops; utility poles or artificial platforms are sometimes used for nesting. In the BLM-FFO region, nesting often occurs on rock spires (NMPIF 2007).

The sagebrush shrublands and piñon-juniper woodlands found within the proposed project areas could provide foraging habitat for ferruginous hawks. Appropriate nesting habitat is not present within or adjacent to the proposed project areas. The nearest recorded ferruginous hawk nest is approximately 23 miles southwest of the proposed project areas (BLM 2012c). No ferruginous hawks were observed during the site surveys of the proposed project areas.

Golden Eagle

Golden eagles may be found in the BLM-FFO region year-round. These raptors occur in open to semi-open country, including open wooded areas, grasslands, shrublands, or barren areas. They prefer hilly or mountainous areas with elevated perches (NMPIF 2007, NatureServe 2012, and Wheeler 2003). Golden eagles may also be found in areas with light agricultural use, but rarely inhabit rural areas. During the breeding season, these eagles are primarily found in areas with mountain cliffs or canyons (NMPIF 2007). Nesting habitat for golden eagles consists of embankments or cliffs and/or flat to moderate areas with scattered large trees (Wheeler 2003). Dense forests are avoided for nesting. In New Mexico, most nests are within steep-walled mountain canyons (NMPIF 2007). During the summer, golden eagles may be found above timberline. During the winter, they are typically found below timberline and may forage in moderate agricultural areas (Wheeler 2003).

The sagebrush shrublands and piñon-juniper woodlands found within the proposed project areas could provide foraging habitat for golden eagles. Appropriate nesting habitat is not present within or adjacent to the proposed project areas. The nearest recorded golden eagle nest is approximately 7 miles northeast of the proposed project areas (BLM 2012c). No golden eagles were observed during the site surveys of the proposed project areas.

Pinyon Jay

Pinyon jays may occur in the BLM-FFO region year-round, with a preference for the foothill regions of New Mexico. This bird species inhabits piñon-juniper woodlands and has a strong association with piñon pine trees. Pinyon jays also have the potential to occur in areas dominated by Ponderosa pine (*Pinus ponderosa*), sagebrush, or chaparral 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 piñon-juniper woodlands (NMPIF 2007).

The piñon-juniper woodlands found within the proposed 172H/173H project area could be used by pinyon jays for breeding and foraging. The sagebrush shrublands found within both of the proposed project areas could be used for foraging pinyon jays. No pinyon jays were observed during the site surveys of the proposed project areas.

3.6.2. Impacts from the Proposed Action

Direct and Indirect Impacts

Habitat loss and fragmentation likely reduce the carrying capacity for wildlife, although the exact level of reduction cannot be quantified (BLM 2003a, 4-26 – 4-27).

There is similar habitat available in the surrounding area that BLM SSS could utilize for foraging. However, the proposed projects would result in the total disturbance of 11.3 acres of foraging habitat for these species. Of this, 2.9 acres would remain active and unvegetated throughout the lifetime of the proposed projects. The remaining acreage would be reclaimed (reseeded only or recontoured and reseeded) during interim reclamation; these reclaimed areas could be used by raptors for foraging. If interim and final reclamation are successful, sagebrush shrubland and piñon-juniper woodland vegetation communities would become re-established within the proposed project areas. However, as discussed in Section 3.4 (Upland Vegetation), the re-establishment of a mature, native plant community could require decades, and it is possible that the plant community could never fully recover from disturbance (BLM 2003a, 4 – 18).

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

American Peregrine Falcon, Ferruginous Hawk, and Golden Eagle

These three BLM SSS could potentially utilize the proposed project areas for foraging. Due to the mobility of adult birds, it is unlikely that these raptors would be directly harmed by activities associated with the proposed projects.

Bendire's Thrasher and Pinyon Jay

Due to the mobility of adult birds, Bendire's thrashers and pinyon jays would be unlikely to be directly harmed by the proposed projects. As discussed in Section 2.1.2 (Description of Proposed Project – Protection of Flora and Fauna, Including SSS and Livestock), if construction activities would occur during the migratory bird breeding season, a pre-construction migratory bird nest survey would be conducted within the associated proposed project area. Therefore, it is unlikely that nests, eggs, or young birds would be directly harmed.

Cumulative Impacts

The spatial analysis area includes the proposed project areas, staging areas, and an approximately 1-mile radius around the proposed well pads. Within a 1-mile radius, there is existing and proposed disturbance, and the region has been fragmented. Existing and reasonably foreseeable future disturbances within a 1-mile radius of the proposed well pads includes the following:

- 14 active oil or gas well pads
- 7 plugged oil and gas well pads
- Approximately 15 miles of BLM Roads
- Approximately 2 miles of County Road 378
- Approximately 2 miles of U.S. Highway 550
- Several utility ROWs
- Livestock and wildlife grazing
- Residential development

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

3.7. Cultural Resources

3.7.1. Affected Environment

The proposed project areas are 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.

The entire Area of Potential Effect (APE) for the proposed action was archaeologically surveyed by LAC at a BLM Class III (100-percent) level.

170H/171H

The archaeological reports, LAC Report Nos. 2012-29x (2013a, BLM 2013(II)012F) and 2012-29x #2 (2013b, BLM 2013[II]012.1F), were prepared and submitted to the BLM in accordance with the *Procedures for Performing Cultural Resources Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities* (BLM 2005).

The Class III inventory resulted in the revisiting of two previously recorded sites within the APE. These two sites are recommended as eligible for nomination to the NRHP (LAC Report No. 2012-29x #2 [2013b], LAC Report Nos. 2012-29x [2013a; BLM 2013(II)012F]). No TCPs are known to exist in the APE.

172H/173H

The archaeological report, LAC Report No. 2013-5nn (2013c; BLM 2014[I]033F), was prepared and submitted to the BLM in accordance with the *Procedures for Performing Cultural Resources Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities* (BLM 2005).

The Class III inventory resulted in the discovery of two cultural sites. These two sites are recommended as eligible for nomination to the NRHP (LAC Report No. 2013-5nn [2013c]; BLM 2014[I]033F).

3.7.2. Impacts from 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) would be avoided with the implementation of design features such as, but not limited to, reduction of construction areas, installation of temporary barriers, and site monitoring. These design features are detailed in the Cultural Resource Record of Review, attached to the COAs in the approved APDs and stipulations attached to the ROW Grants. 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:

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

4.2. List of Preparers

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

- Amber Ballman, Environmental Scientist, NCI
- Jenny Holmen, Senior Environmental Scientist, NCI
- Amanda Nisula, Planning and Environmental Specialist, BLM-FFO
- Barney Wegener, 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
- Roger Herrera, Environmental Protection Specialist, BLM-FFO
- Vera Matthews, Realty 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.

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

_____. 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.

_____. 2011d. Roads Design Handbook. H-9113-1

_____. 2011e. BLM Roads National Inventory and Condition Assessment Guidance and Instructions. H-9113-2.

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

_____. 2012b. prairie_dog_colonies.shp (Shapefile of recorded prairie dog colonies within the general BLM-FFO region). Provided by BLM-FFO 2012.

_____. 2012c. ffo_raptors_12122012.shp (Shapefile of recorded raptor SMS nests within BLM-FFO area, updated December 12, 2012).

_____. 2013a. Air Resources Technical Report for Oil and Gas Development. New Mexico, Oklahoma, Texas, and Kansas. Santa Fe, New Mexico: Bureau of Land Management, New Mexico State Office.

_____. 2013b. BLM-FFO Bare Soil Reclamation Procedures. Available at: http://www.blm.gov/nm/st/en/fo/Farmington_Field_Office/ffo_planning/surface_use_plan_of.html. Accessed April 2013.

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.

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

Environmental Protection Agency (EPA). 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.

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

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

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

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

Eveling, D.W., and A. Bataille. 1984. The effect of deposits of small particles on the resistance of leaves and petals to water loss. Environmental Pollution. 36:229-238.

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

Griffith, G.E., J.M. Omernik, M.M. McGraw, G.Z Jacobi, C.M. Canavan, T.S. Schrader, D. Mercer, R. Hill, and B.C. Moran. 2006. Ecoregions of New Mexico (color poster with map, descriptive text, summary tables, and photographs). Reston, Virginia: U.S. Geological Survey (map scale 1:1,400,000).

Hirano, T., M. Kiyota, and I. Aiga. 1995. Physical effects of dust on the leaf physiology of Cucumber and Kidnekbean plant. Environmental Pollution 89(3):225-261.

Holmes, A.L. and A.V. King. 2006. Vital Rates of Sagebrush Obligate Songbirds in Relation to Natural Gas Development and Weather. Abstract Oral Presentation to IV North American Ornithological Congress. Veracruz, Mexico.

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

_____. 2007b, Synthesis Report. A Report of the Intergovernmental Panel on Climate Change.

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

La Plata Archaeological Consultants (LAC). 2013a. A Cultural Resources Survey of WPX Energy Production LLC's Lybrook 23-7-12 Number 201H Well Pad and Access Road, Rio Arriba County, New Mexico. LAC Report 2012-29x.

_____. 2013b. A Cultural Resources Survey of WPX Energy Production LLC's Chaco 2307-12L Number 170H Dual Well Pad Expansion, Rio Arriba County, New Mexico. LAC Report 2012-29x #2.

_____. 2013c. A Cultural Resources Survey of WPX Energy Production LLC's Chaco 2307-13D Number 172H/173H Dual Well Pad and Access Road and Two Abandoned Well Pads, Rio Arriba County, New Mexico. LAC Report 2013-5nn.

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

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

Natural Resources Conservation Service (NRCS). 2008. Soil Survey of Rio Arriba Area, New Mexico: Parts of Rio Arriba and Sandoval Counties. Web Soil Survey. Available at: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. NatureServe, Arlington, VA. http://www.natureserve.org/explorer. Accessed May 2013.

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.

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

New Mexico Office of the State Engineer. 2011. GIS shapefile: ose_wells_July2011. 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. Compiled by C. Rustay and S. Norris. Albuquerque, New Mexico.

Sibley, David Allen. 2000. The National Audubon Society: The Sibley Guide to Birds. New York, New York: Alfred A. Knopf, Inc.

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.

Thompson, J. R., P.W. Mueller, W. Fluckiger, A.J. and Rutter. 1984. The effects of dust on photosynthesis and its significance for roadside plants. Environmental Pollution 34(2):171-190.

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. Fish and Wildlife Service (USFWS). 2013. New Mexico Listed and Sensitive Species Lists. New Mexico Ecological Services Field Office. Available at: http://www.fws.gov/southwest/es/NewMexico/SBC.cfm. Accessed November 2013.

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.

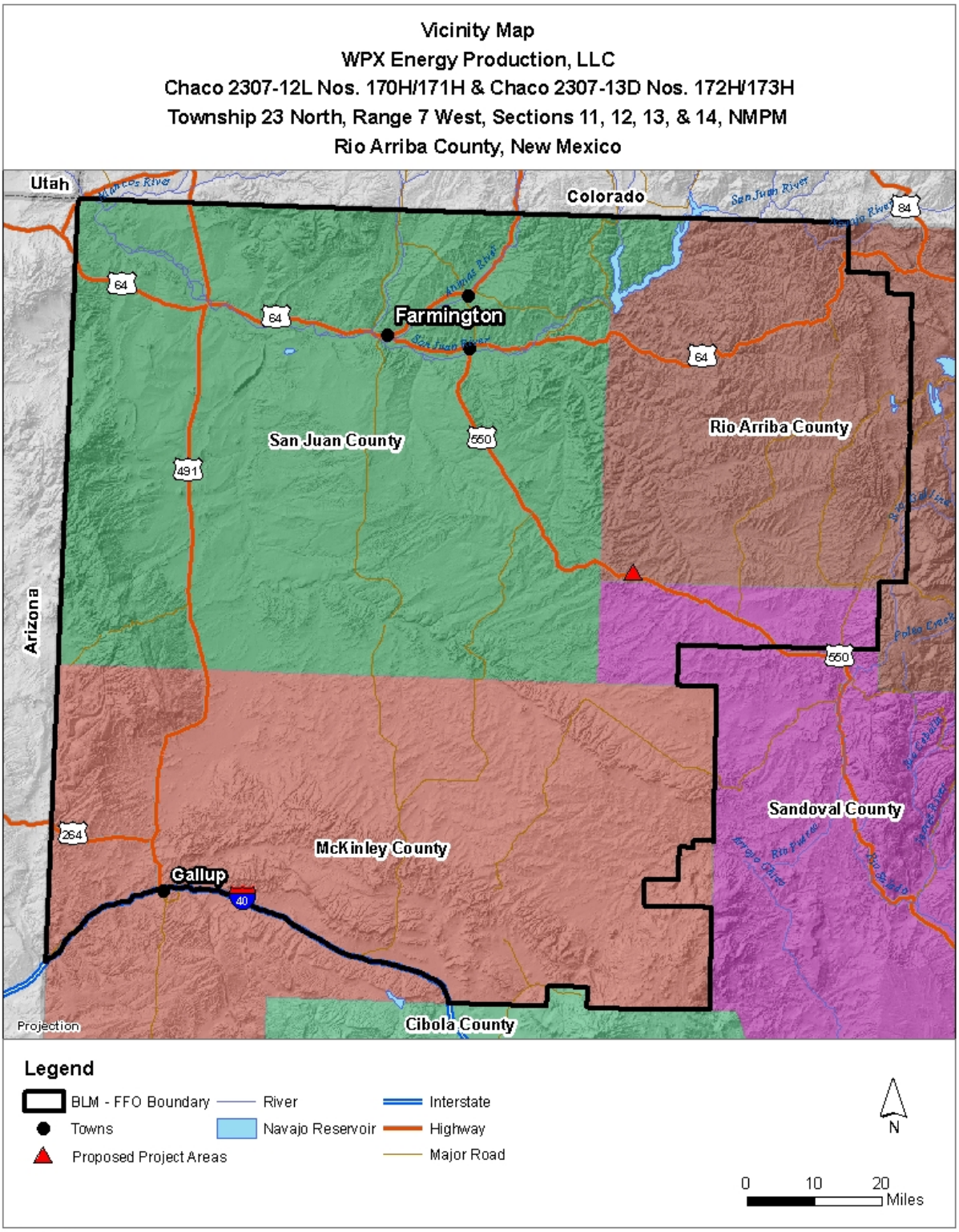
Van Valkenburgh, Richard F. 1941.Diné Bikeyah. Window Rock, Arizona: Department of the Interior, Office of Indian Affairs, Navajo Services. Ms. on file at BLM-FFO.

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

Wheeler, Brian K. 2003. Raptors of Western North America. Princeton, New Jersey: Princeton University Press.

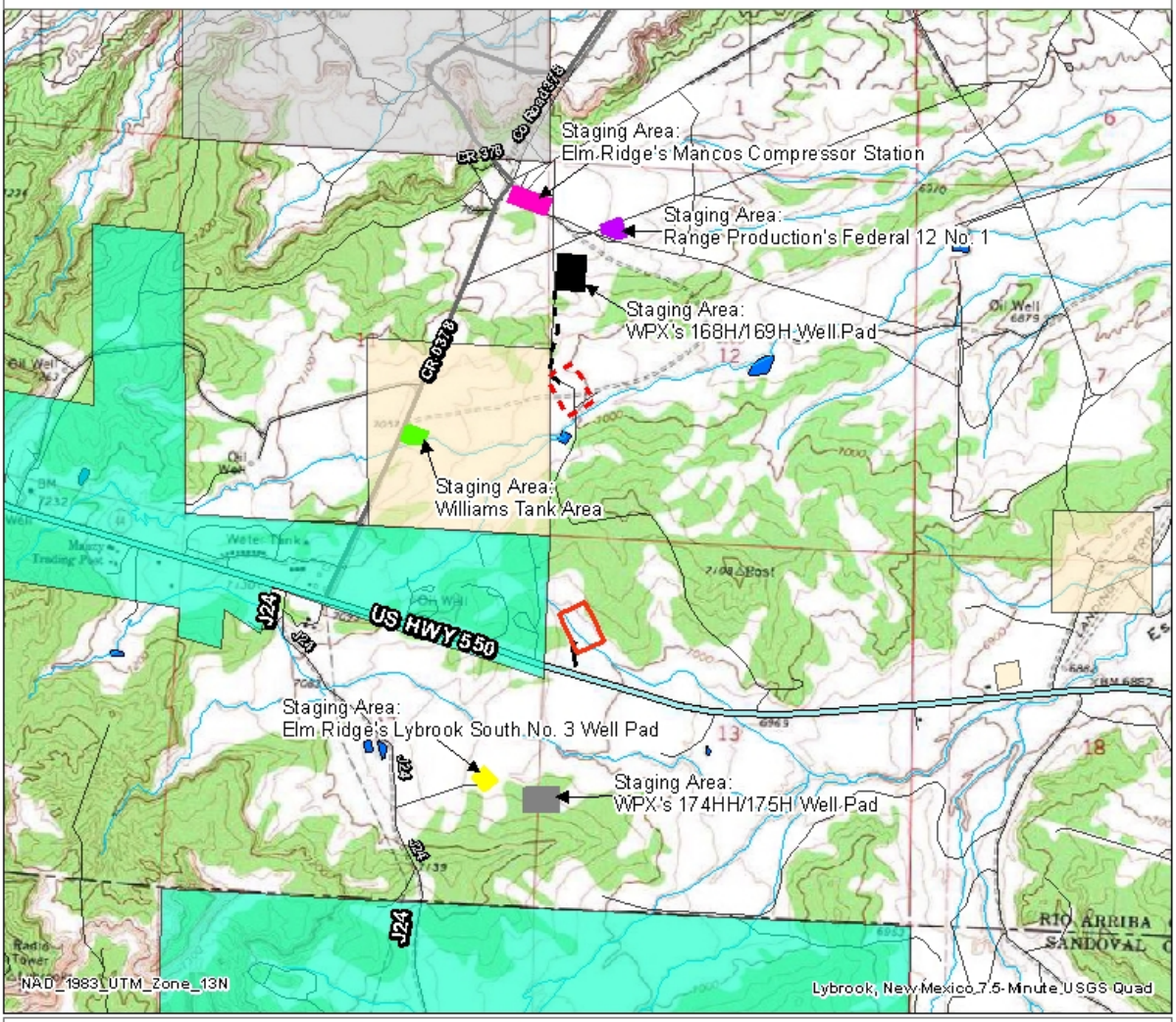
APPENDIX A. MAPS

A.1. Vicinity Map



A.2. Project Area Map

Project Area Map
WPX Energy Production, LLC
Chaco 2307-12L Nos. 170H/171H & Chaco 2307-13D Nos. 172H/173H
Township 23 North, Range 7 West, Sections 11, 12, 13, & 14, NMPM
Rio Arriba County, New Mexico



Legend

Proposed 170H/171H
- Access Road
- Well Pad & Construction Zone

Proposed 172H/173H
- Access Road
- Well Pad & Construction Zone

USGS Watercourse
Pond

Existing Roads
- County Road
- U.S. Highway
- BLM Roads

Land Ownership/Management
- BLM
- Tribal
- Private
- State

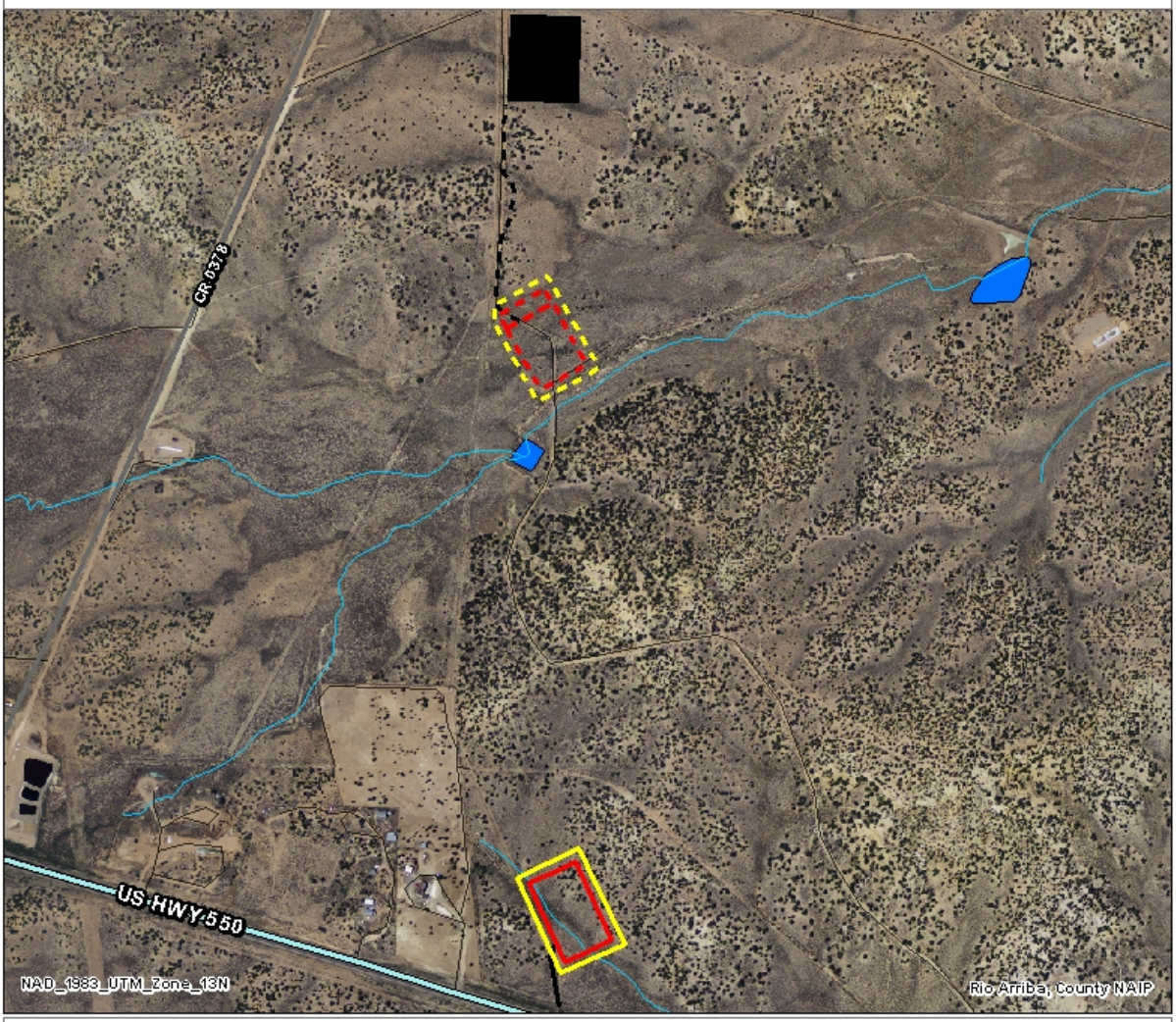
N

0 1,200 2,400 Feet

12/13/2013

A.3. Aerial Map

Project Aerial Map
WPX Energy Production, LLC
Chaco 2307-12L Nos. 170H/171H & Chaco 2307-13D Nos. 172H/173H
Township 23 North, Range 7 West, Sections 11, 12, 13, & 14, NMPM
Rio Arriba County, New Mexico



Legend

Proposed 170H/171H
- Access Road
- Well Pad
- Well Pad Construction Zone

Existing 168H/169H Well Pad

Proposed 172H/173H
- Access Road
- Well Pad
- Well Pad Construction Zone

USGS Watercourse

Pond

Existing Roads
- County Road
- U.S. Highway
- BLM Roads

N

0 500 1,000 Feet

12/13/2013

APPENDIX B. PLATS

B.1. 170H/171H Plats

District I
1625 N. French Drive, Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

District II
811 S. First Street, Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170

District IV
1220 S. St. Francis Drive, Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION
1220 South St. Francis Drive
Santa Fe, NM 87505

Form C-102
Revised August 1, 2011

Submit one copy to
Appropriate District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name
	42289	LYBROOK GALLUP

[4] Property Code	[5] Property Name	[6] Well Number
	CHACO 2307-12L	170H

[7] OGRID No.	[8] Operator Name	[9] Elevation
120782	WPX ENERGY PRODUCTION, LLC	7002'

[10] Surface Location

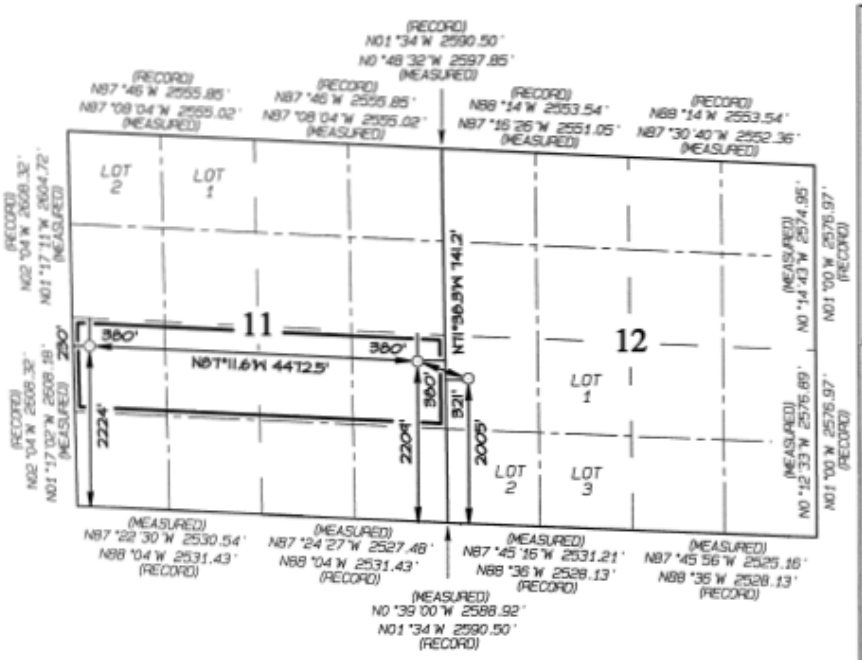
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
L	12	23N	7W		2005	SOUTH	321	WEST	RIO ARRIBA

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
L	11	23N	7W		2224	SOUTH	230	WEST	RIO ARRIBA

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
160.0 Acres N/2 S/2 - Section 11			

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



END-OF-LATERAL
2224' FSL 230' FWL
SECTION 11, T23N, R7W
LAT: 36.23924 °N
LONG: 107.55194 °W
DATUM: NAD1927

LAT: 36.23925 °N
LONG: 107.55255 °W
DATUM: NAD1983

POINT-OF-ENTRY
2209' FSL 380' FEL
SECTION 11, T23N, R7W
LAT: 36.23880 °N
LONG: 107.53679 °W
DATUM: NAD1927

LAT: 36.23881 °N
LONG: 107.53739 °W
DATUM: NAD1983

SURFACE LOCATION
2005' FSL 321' FWL
SECTION 12, T23N, R7W
LAT: 36.23918 °N
LONG: 107.53439 °W
DATUM: NAD1927

LAT: 36.23920 °N
LONG: 107.53500 °W
DATUM: NAD1983

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom-hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature Date

Printed Name

E-mail Address

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

Date Revised: NOVEMBER 24, 2013
Date of Survey: AUGUST 17, 2012

Signature and Seal of Professional Surveyor

JASON C. EDWARDS
NEW MEXICO
15269
REGISTERED PROFESSIONAL SURVEYOR

JASON C. EDWARDS
Certificate Number 15269

District I
1625 N. French Drive, Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

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Phone: (575) 748-1283 Fax: (575) 748-9720

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Phone: (505) 334-6178 Fax: (505) 334-6170

District IV
1220 S. St. Francis Drive, Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION
1220 South St. Francis Drive
Santa Fe, NM 87505

Form C-102
Revised August 1, 2011

Submit one copy to
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☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name
	42289	LYBROOK GALLUP

[4] Property Code	[5] Property Name	[6] Well Number
	CHACO 2307-12L	171H

[7] OGRID No.	[8] Operator Name	[9] Elevation
120782	WPX ENERGY PRODUCTION, LLC	7002'

[10] Surface Location

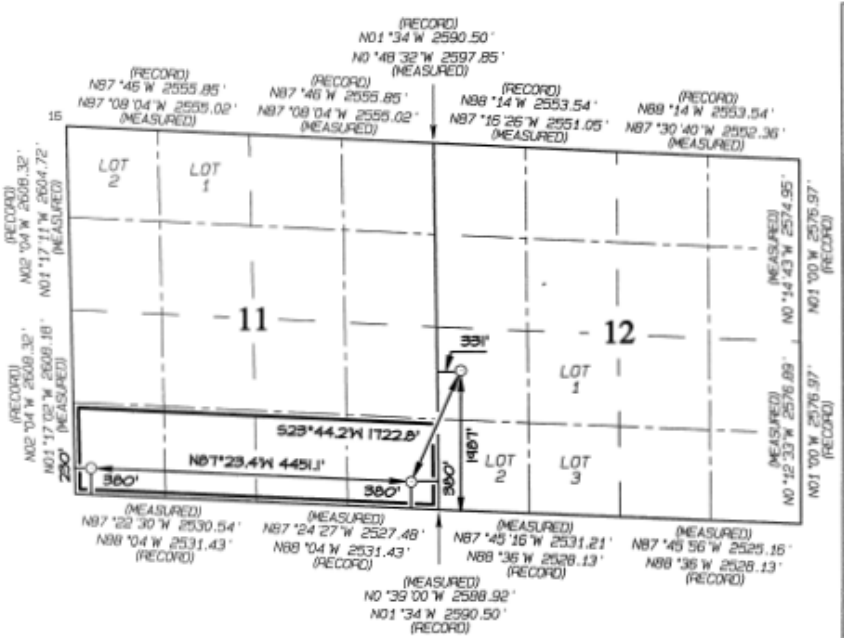
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
L	12	23N	7W		1987	SOUTH	331	WEST	RIO ARRIBA

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
M	11	23N	7W		380	SOUTH	230	WEST	RIO ARRIBA

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
160.0 Acres S/2 S/2 - Section 11			

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



END-OF-LATERAL
380' FSL 230' FWL
SECTION 11, T23N, R7W
LAT: 36.23417 °N
LONG: 107.55172 °W
DATUM: NAD1927

LAT: 36.23418 °N
LONG: 107.55232 °W
DATUM: NAD1983

POINT-OF-ENTRY
380' FSL 380' FEL
SECTION 11, T23N, R7W
LAT: 36.23378 °N
LONG: 107.53663 °W
DATUM: NAD1927

LAT: 36.23379 °N
LONG: 107.53724 °W
DATUM: NAD1983

SURFACE LOCATION
1987' FSL 331' FWL
SECTION 12, T23N, R7W
LAT: 36.23813 °N
LONG: 107.53435 °W
DATUM: NAD1927

LAT: 36.23815 °N
LONG: 107.53496 °W
DATUM: NAD1983

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom-hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature Date

Printed Name

E-mail Address

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

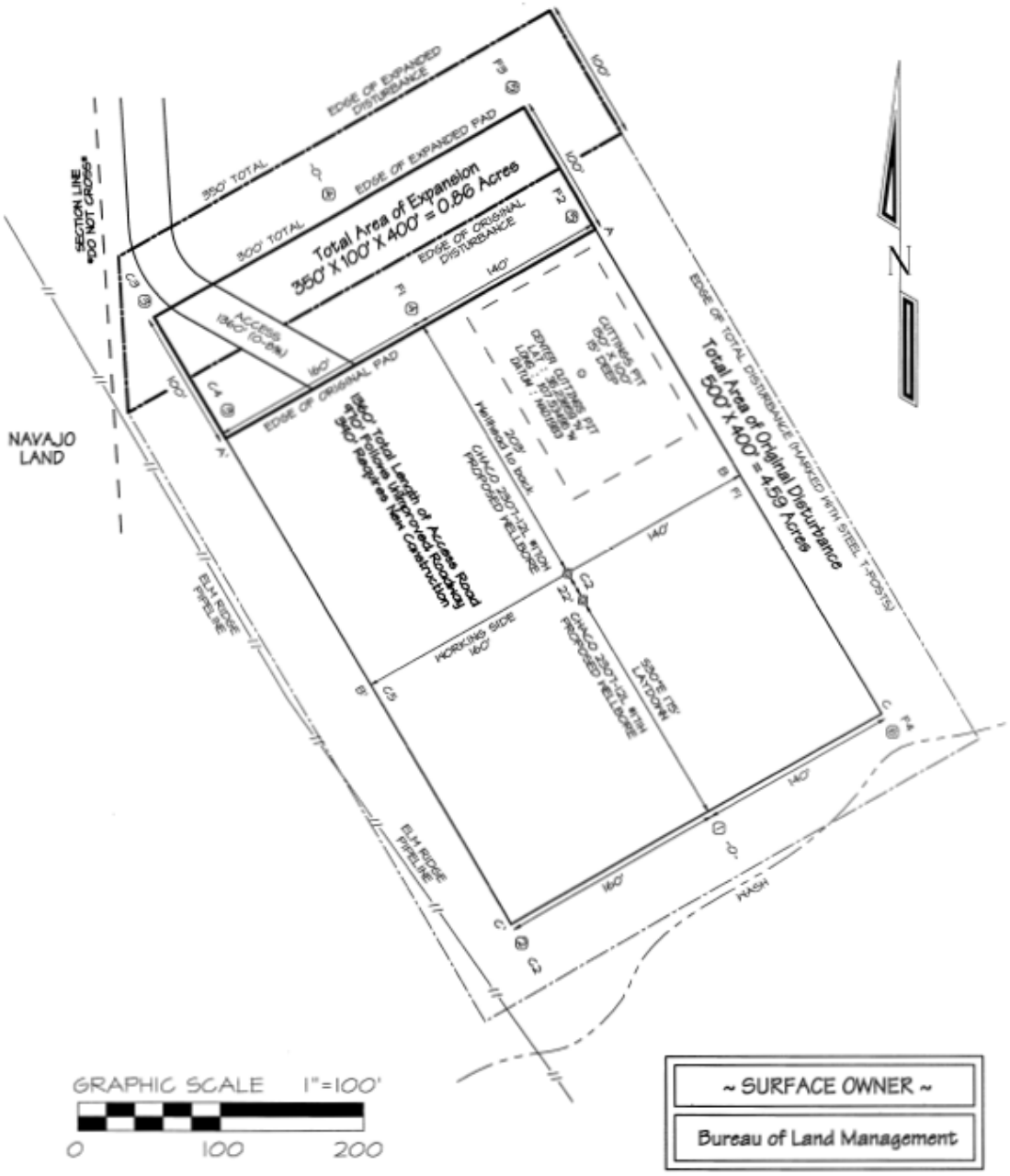
Date Revised: NOVEMBER 25, 2013
Date of Survey: AUGUST 17, 2012

Signature and Seal of Professional Surveyor

JASON C. EDWARDS
NEW MEXICO
15269
REGISTERED PROFESSIONAL SURVEYOR

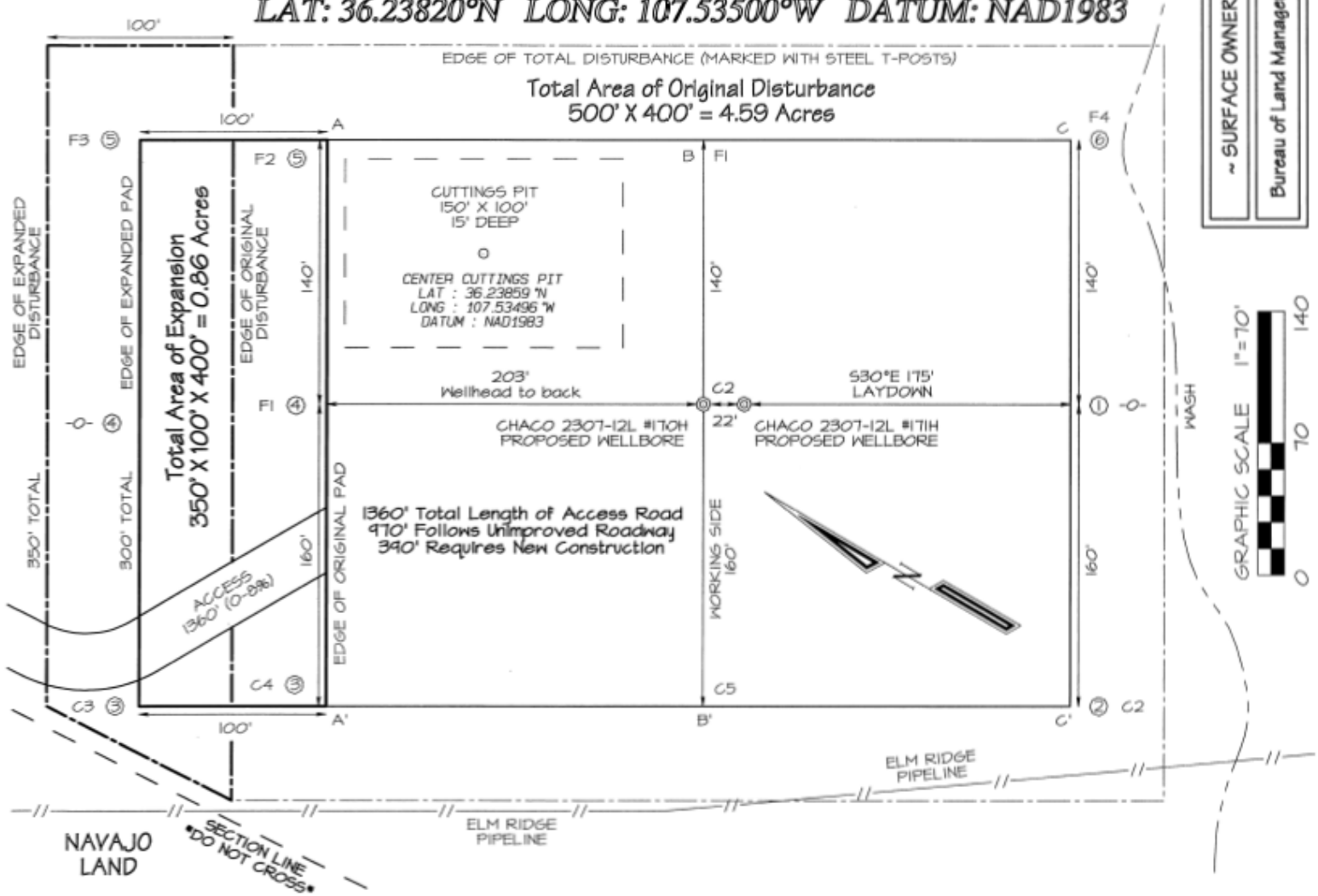
JASON C. EDWARDS
Certificate Number 15269

WPX ENERGY PRODUCTION, LLC CHACO 2307–12L #170H
2005' FSL & 321' FWL, SECTION 12, T23N, R7W, NMPM
RIO ARRIBA COUNTY, NEW MEXICO ELEVATION: 7002'
LAT: 36.23820°N LONG: 107.53500°W DATUM: NAD1983



Steel T-Posts have been set to define Edge of Disturbance limits which are 50' offset from edge of staked wellpad.

WPX ENERGY PRODUCTION, LLC CHACO 2307–12L #170H
2005' FSL & 321' FWL, SECTION 12, T23N, R7W, NMPM
RIO ARRIBA COUNTY, NEW MEXICO ELEVATION: 7002'
LAT: 36.23820°N LONG: 107.53500°W DATUM: NAD1983

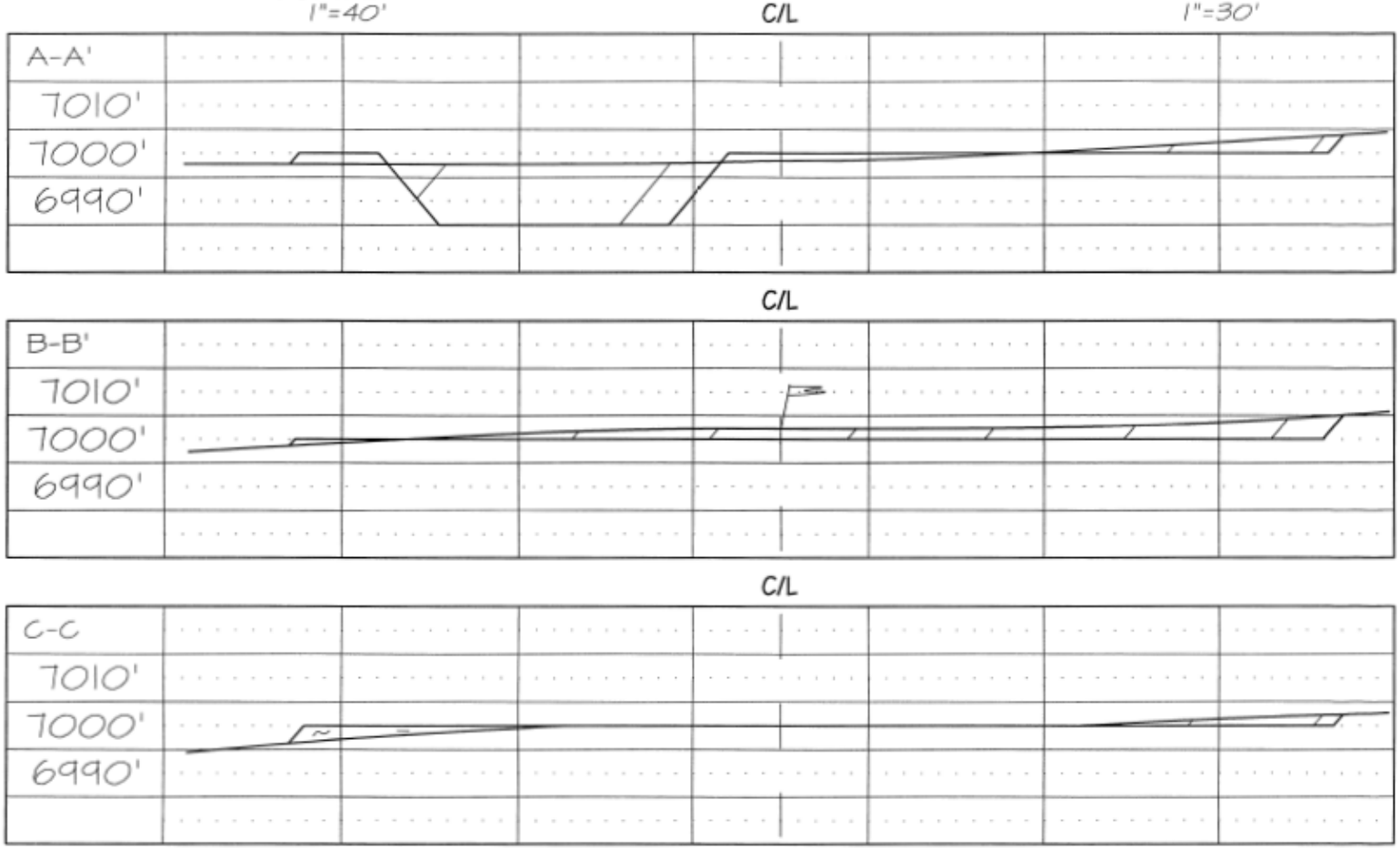


Steel T-Posts have been set to define the Edge of Disturbance limits which are 50' offset from the edge of the staked wellpad.

WPX ENERGY PRODUCTION, LLC CHACO 2307–12L #170H
2005' FSL & 321' FWL, SECTION 12, T23N, R7W, NMPM
RIO ARRIBA COUNTY, NEW MEXICO ELEVATION: 7002'

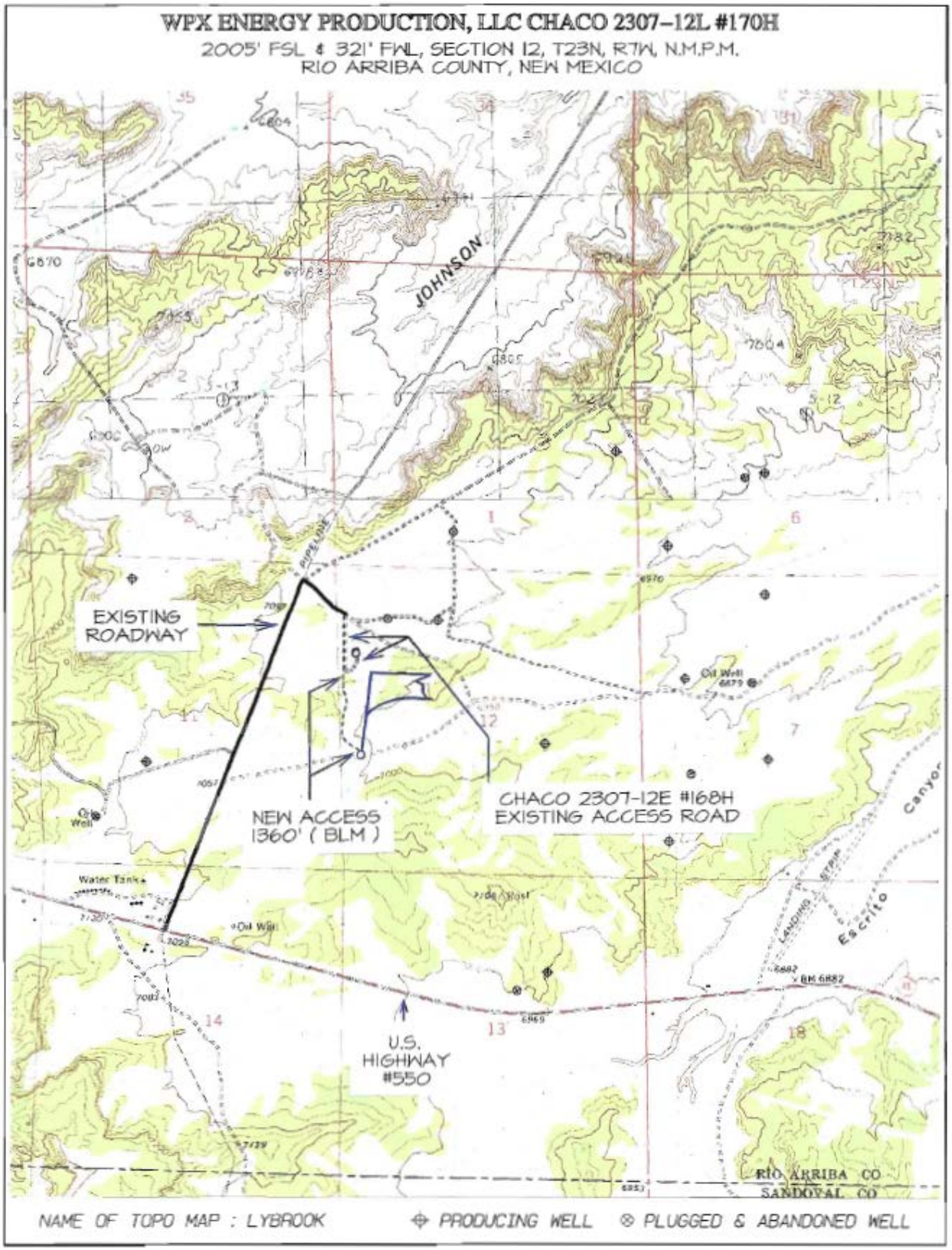
HORIZONTAL SCALE
1"=40'

VERTICAL SCALE
1"=30'



NCE SURVEYS IS NOT LIABLE FOR LOCATION OF UNDERGROUND UTILITIES OR PIPELINES.

CONTRACTOR SHOULD CONTACT ONE-CALL FOR LOCATION OF ANY MARKED OR UNMARKED UNDERGROUND UTILITIES OR PIPELINES ON WELLPAD AND/OR ACCESS ROAD AT LEAST TWO WORKING DAYS PRIOR TO CONSTRUCTION.


WPX ENERGY PRODUCTION, LLC CHACO 2307-12L #170H
2005' FSL & 321' FWL, SECTION 12, T23N, R7W, N.M.P.M.
RIO ARRIBA COUNTY, NEW MEXICO
JOHNSON
EXISTING ROADWAY
NEW ACCESS 1360' (BLM)
CHACO 2307-12E #168H EXISTING ACCESS ROAD
U.S. HIGHWAY #550
Water Tank
Oil Well
RIO ARRIBA CO
SANDOVAL CO
NAME OF TOPO MAP : LYBROOK
PRODUCING WELL
PLUGGED & ABANDONED WELL

B.2. 172H/173H Plats

District I
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State of New Mexico
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Revised August 1, 2011

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WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name
	42289	LYBROOK GALLUP

[4] Property Code	[5] Property Name	[6] Well Number
	CHACO 2307-13D	172H

[7] OGRID No.	[8] Operator Name	[9] Elevation
120782	WPX ENERGY PRODUCTION, LLC	7014'

[10] Surface Location

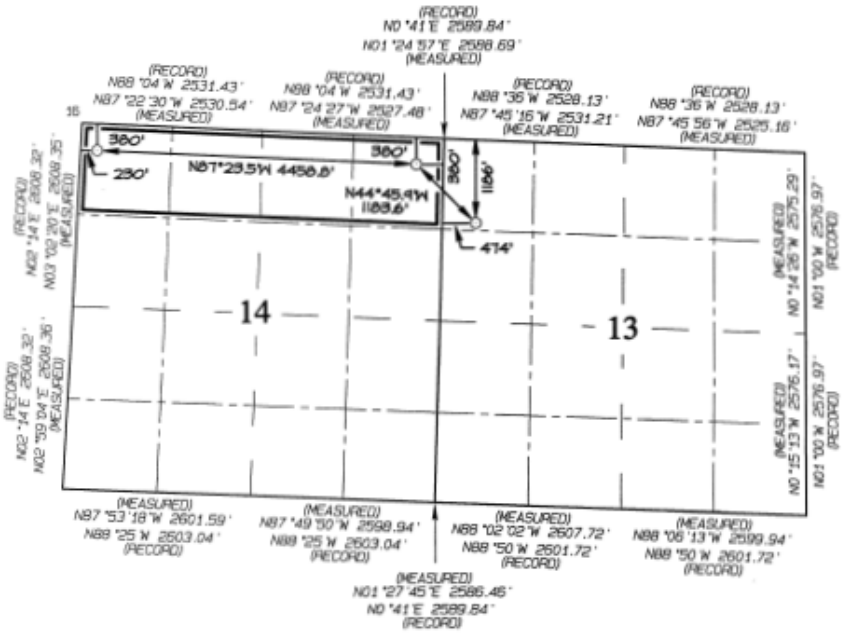
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	13	23N	7W		1186	NORTH	474	WEST	RIO ARRIBA

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	14	23N	7W		380	NORTH	230	WEST	RIO ARRIBA

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
160.0 Acres N/2 N/2 - Section 14			

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



END-OF-LATERAL
380' FNL 230' FWL
SECTION 14, T23N, R7W
LAT: 36.23208 °N
LONG: 107.55172 °W
DATUM: NAD1927

LAT: 36.23210 °N
LONG: 107.55233 °W
DATUM: NAD1983

POINT-OF-ENTRY
380' FNL 380' FEL
SECTION 14, T23N, R7W
LAT: 36.23169 °N
LONG: 107.53662 °W
DATUM: NAD1927

LAT: 36.23170 °N
LONG: 107.53722 °W
DATUM: NAD1983

SURFACE LOCATION
1186' FNL 474' FWL
SECTION 13, T23N, R7W
LAT: 36.22941 °N
LONG: 107.53375 °W
DATUM: NAD1927

LAT: 36.22942 °N
LONG: 107.53436 °W
DATUM: NAD1983

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom-hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature Date

Printed Name

E-mail Address

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

Date Revised: NOVEMBER 24, 2013
Survey Date: OCTOBER 24, 2013

Signature and Seal of Professional Surveyor

JASON C. EDWARDS
NEW MEXICO
15269
REGISTERED PROFESSIONAL SURVEYOR

JASON C. EDWARDS
Certificate Number 15269

District I
1625 N. French Drive, Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

District II
811 S. First Street, Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170

District IV
1220 S. St. Francis Drive, Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION
1220 South St. Francis Drive
Santa Fe, NM 87505

Form C-102
Revised August 1, 2011

Submit one copy to
Appropriate District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1]API Number	[2]Pool Code	[3]Pool Name
	42289	LYBROOK GALLUP

[4]Property Code	[5]Property Name	[6]Well Number
	CHACO 2307-13D	173H

[7]OGRID No.	[8]Operator Name	[9]Elevation
120782	WPX ENERGY PRODUCTION, LLC	7014'

[10] Surface Location

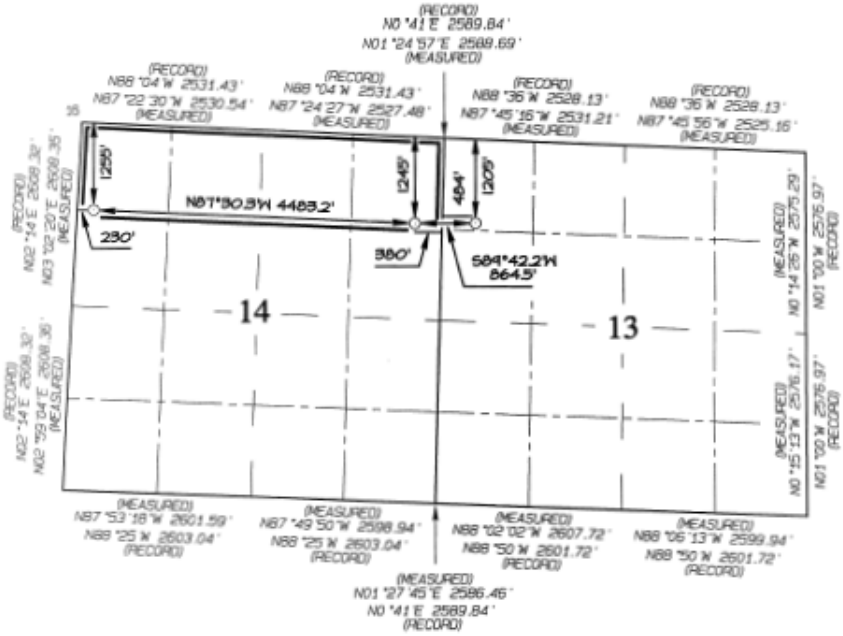
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	13	23N	7W		1205	NORTH	484	WEST	RIO ARRIBA

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	14	23N	7W		1255	NORTH	230	WEST	RIO ARRIBA

[12]Dedicated Acres	[13]Joint or Infill	[14]Consolidation Code	[15]Order No.
160.0 Acres N/2 N/2 - Section 14			

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



END-OF-LATERAL
1255' FNL 230' FWL
SECTION 14, T23N, R7W
LAT: 36.22968°N
LONG: 107.55184°W
DATUM: NAD1927

LAT: 36.22970°N
LONG: 107.55245°W
DATUM: NAD1983

POINT-OF-ENTRY
1245' FNL 380' FEL
SECTION 14, T23N, R7W
LAT: 36.22931°N
LONG: 107.53665°W
DATUM: NAD1927

LAT: 36.22933°N
LONG: 107.53726°W
DATUM: NAD1983

SURFACE LOCATION
1205' FNL 484' FWL
SECTION 13, T23N, R7W
LAT: 36.22936°N
LONG: 107.53372°W
DATUM: NAD1927

LAT: 36.22937°N
LONG: 107.53433°W
DATUM: NAD1983

[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom-hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature Date

Printed Name

E-mail Address

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

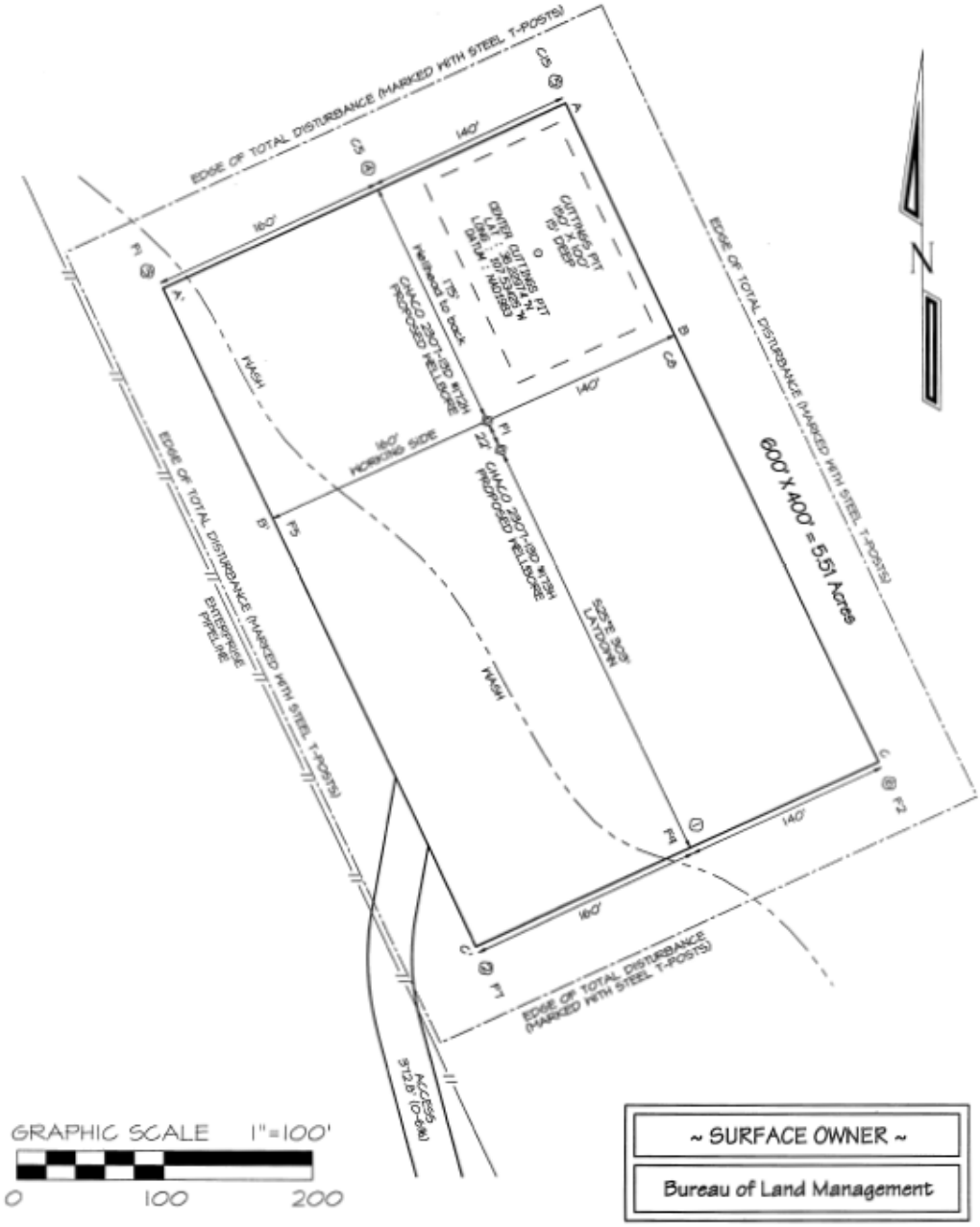
Date Revised: DECEMBER 19, 2013
Survey Date: OCTOBER 24, 2013

Signature and Seal of Professional Surveyor

JASON C. EDWARDS
NEW MEXICO
15269
REGISTERED PROFESSIONAL SURVEYOR

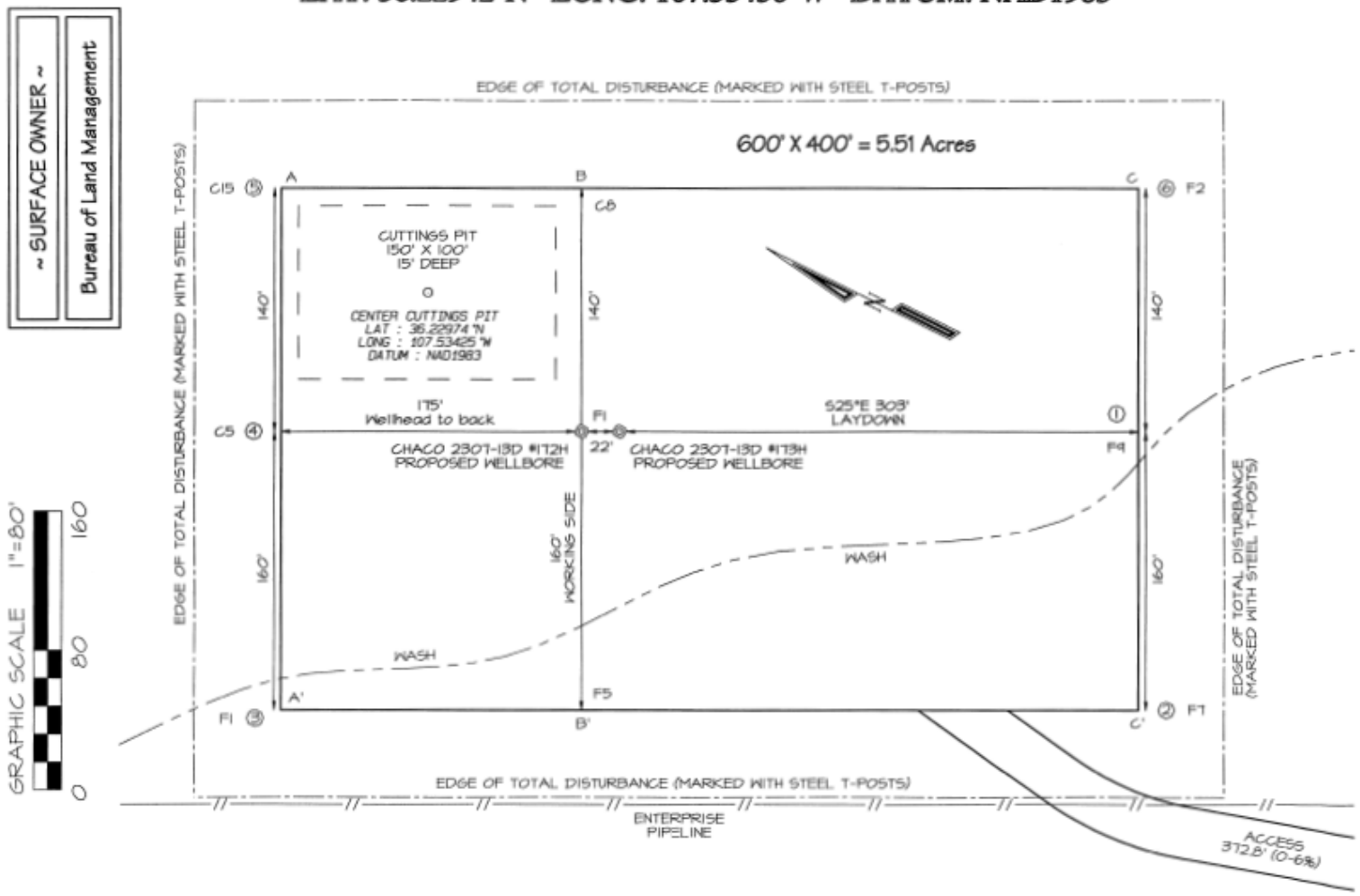
JASON C. EDWARDS
Certificate Number 15269

WPX ENERGY PRODUCTION, LLC CHACO 2307–13D #172H
1186' FNL & 474' FWL, SECTION 13, T23N, R7W, NMPM
RIO ARRIBA COUNTY, NEW MEXICO ELEVATION: 7014'
LAT: 36.22942°N LONG: 107.53436°W DATUM: NAD1983



Steel T-Posts have been set to define Edge of Disturbance limits which are 50' offset from edge of staked wellpad.

WPX ENERGY PRODUCTION, LLC CHACO 2307–13D #172H
1186' FNL & 474' FWL, SECTION 13, T23N, R7W, NMPM
RIO ARRIBA COUNTY, NEW MEXICO ELEVATION: 7014'
LAT: 36.22942°N LONG: 107.53436°W DATUM: NAD1983

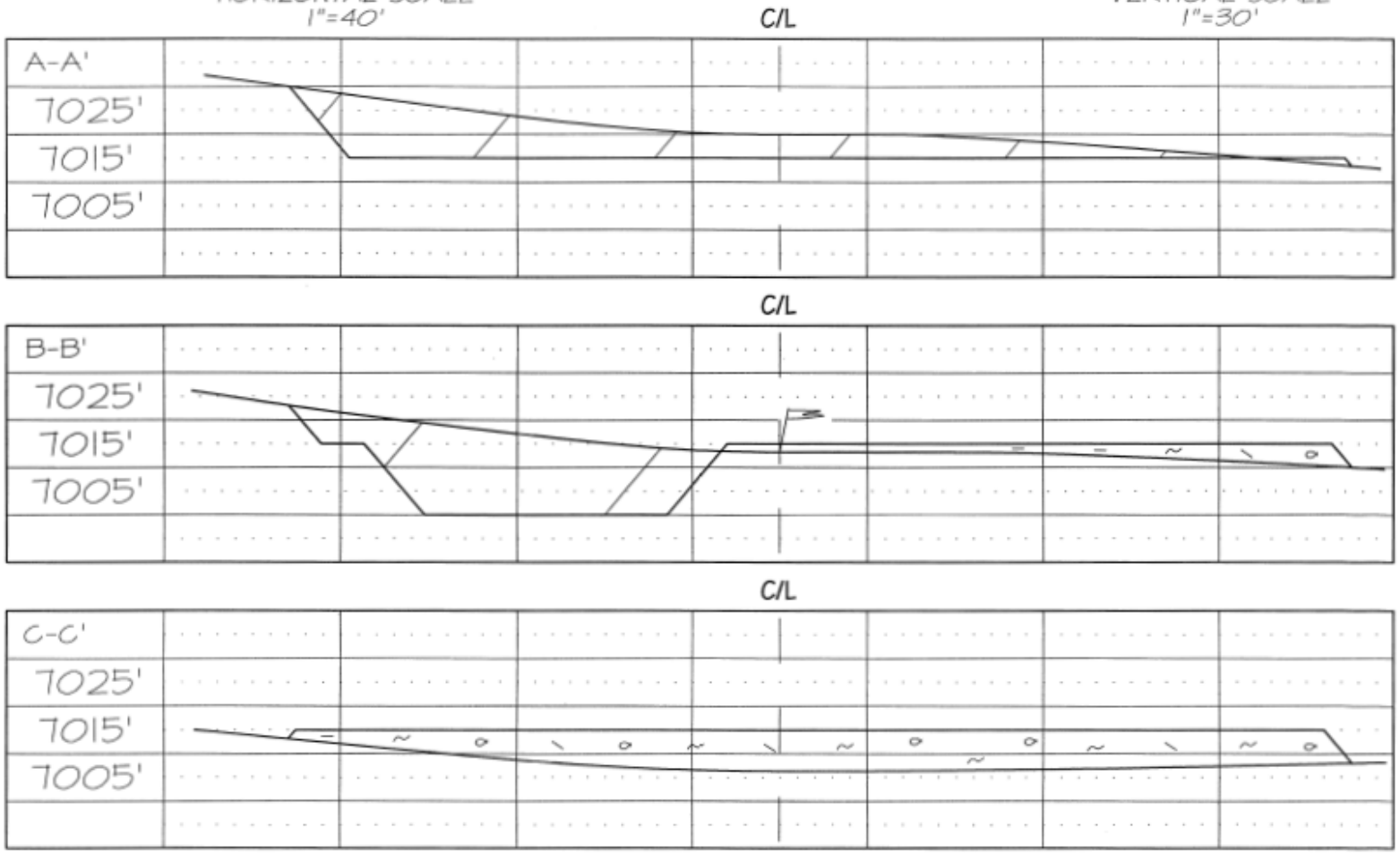


Steel T-Posts have been set to define the Edge of Disturbance limits which are 50' offset from the edge of the staked wellpad.

WPX ENERGY PRODUCTION, LLC CHACO 2307–13D #172H
1186' FNL & 474' FWL, SECTION 13, T23N, R7W, NMPM
RIO ARRIBA COUNTY, NEW MEXICO ELEVATION: 7014'

HORIZONTAL SCALE
1"=40'

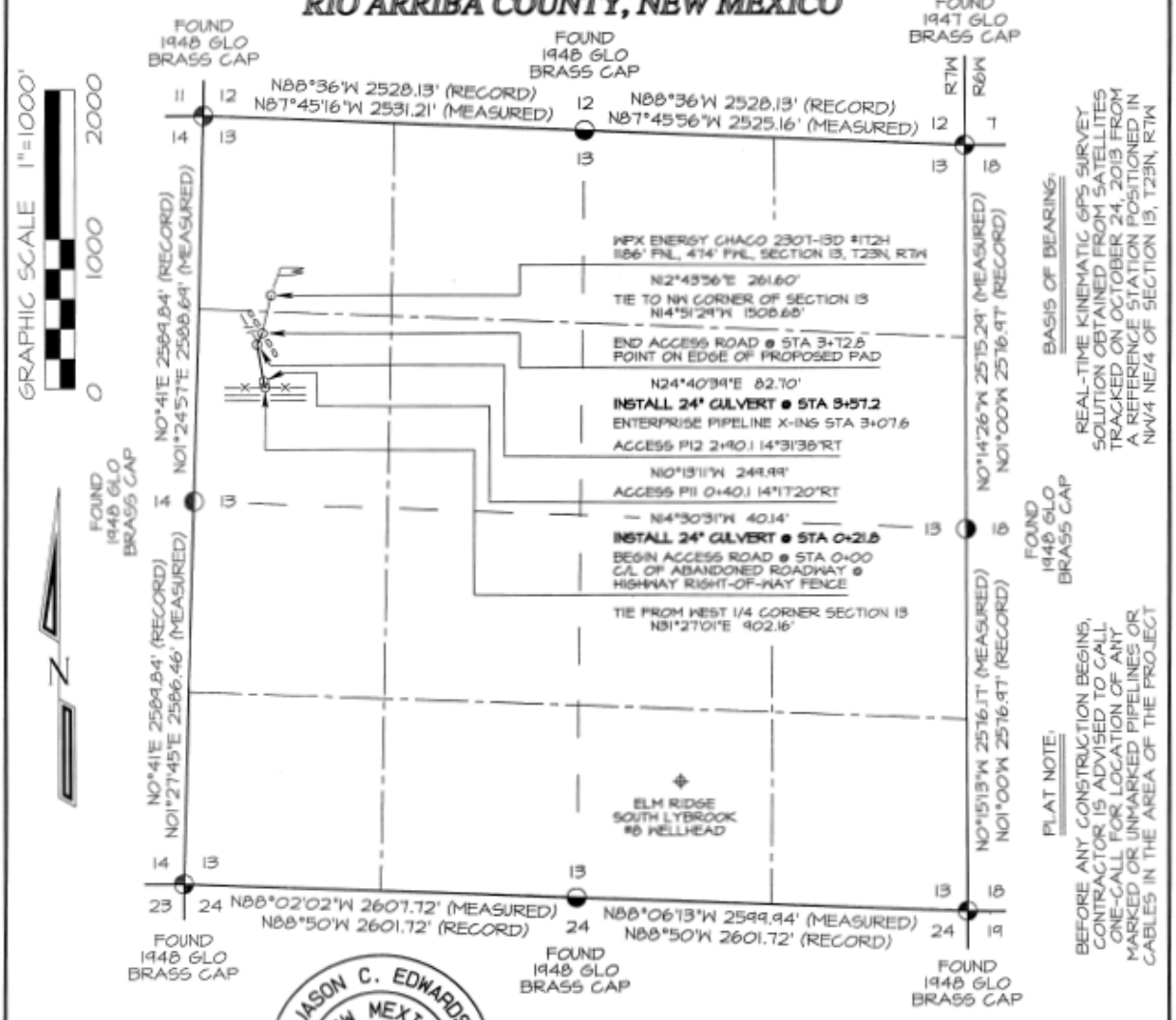
VERTICAL SCALE
1"=30'



NCE SURVEYS IS NOT LIABLE FOR LOCATION OF UNDERGROUND UTILITIES OR PIPELINES.

CONTRACTOR SHOULD CONTACT ONE-CALL FOR LOCATION OF ANY MARKED OR UNMARKED UNDERGROUND UTILITIES OR PIPELINES ON WELLPAD AND/OR ACCESS ROAD AT LEAST TWO WORKING DAYS PRIOR TO CONSTRUCTION.

WPX ENERGY PRODUCTION, LLC CHACO 2307–13D #172H
PROPOSED ACCESS ROAD SURVEY LOCATED IN THE W/2 NW/4 OF SECTION 13, T23N, R7W, NMPM
RIO ARRIBA COUNTY, NEW MEXICO



BASIS OF BEARING:

REAL-TIME KINEMATIC GPS SURVEY SOLUTION OBTAINED FROM SATELLITES TRACKED ON OCTOBER 24, 2013 FROM A REFERENCE STATION POSITIONED IN NW/4 NE/4 OF SECTION 13, T23N, R7W

PLAT NOTE:

BEFORE ANY CONSTRUCTION BEGINS, CONTRACTOR IS ADVISED TO CALL ONE-CALL FOR LOCATION OF ANY MARKED OR UNMARKED PIPELINES OR CABLES IN THE AREA OF THE PROJECT

JASON C. EDWARDS
NEW MEXICO
15269
REGISTERED PROFESSIONAL SURVEYOR

~ SURFACE OWNERSHIP ~ Bureau of Land Management	
0+00 TO 3+72.8	372.8 FT / 22.6 RODS

I, Jason C. Edwards, a registered Professional Surveyor under the laws of the State of New Mexico, hereby certify that this plat was prepared from field notes of an actual survey meeting the minimum requirements of the standards for easement surveys and is true and correct to the best of my knowledge and belief.

JASON C. EDWARDS Date: November 24, 2013

Jason C. Edwards, P.L.S.
New Mexico L.S. #15269

Prepared for:
WPX ENERGY PRODUCTION
P.O. BOX #640
AZTEC, NM 87410

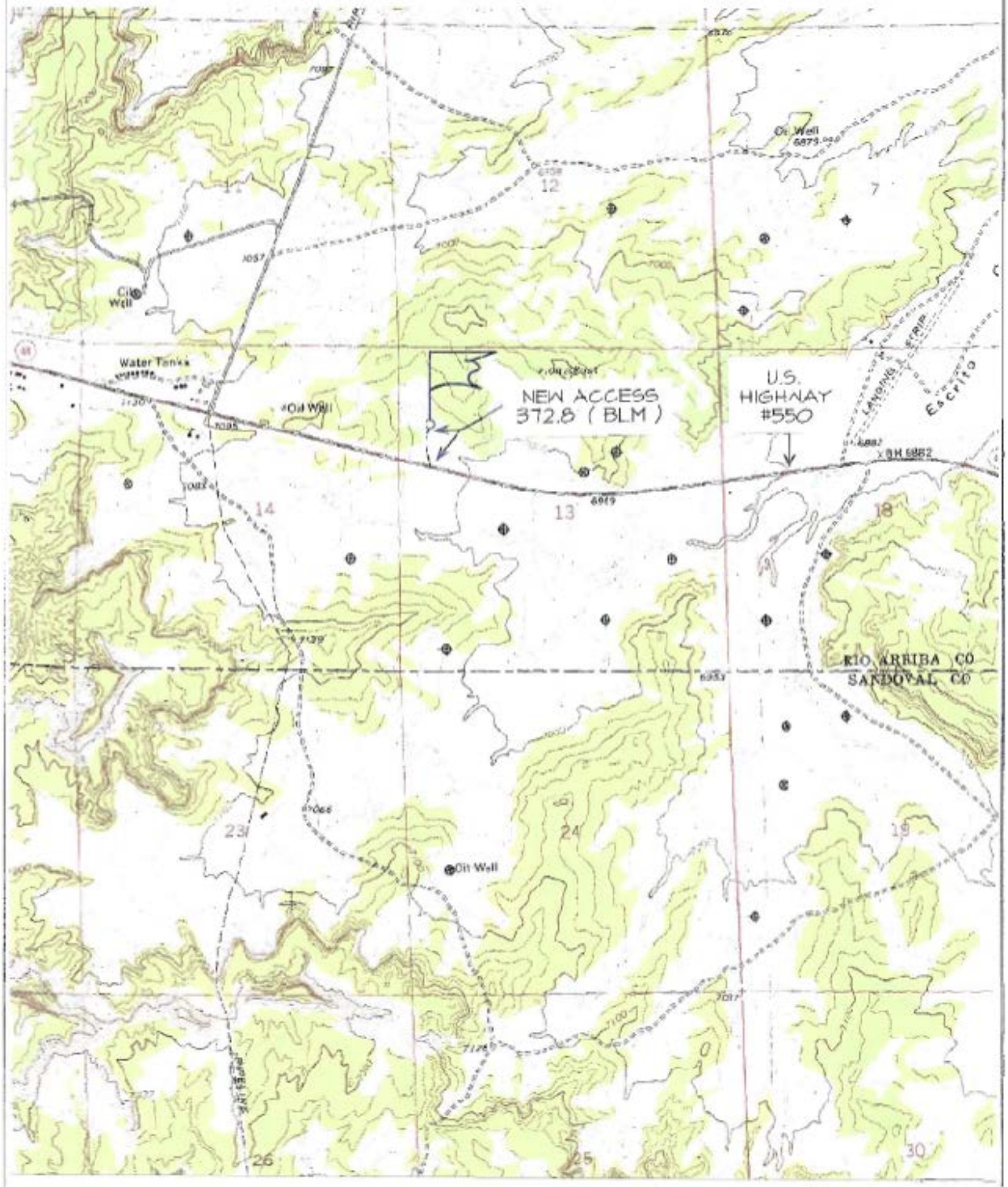
N C E

Land Surveyor:
Jason C. Edwards
Mailing Address:
Post Office Box 6612
Farmington, NM 87499
Business Address:
111 East Pinon Street
Farmington, NM 87402
(505) 325-2654 (Office)
(505) 326-5650 (Fax)
SURVEYS, INC.

CHECKED BY: JCE
DRAWN BY: SLE
SHEET 5 OF 6
FILENAME: 2361SDM

WPX ENERGY PRODUCTION, LLC CHACO 2307-13D #172H

1186' FNL & 474' FWL, SECTION 13, T23N, R7W, N.M.P.M.
RIO ARRIBA COUNTY, NEW MEXICO



NAME OF TOPO MAP : LYBROOK ⊕ PRODUCING WELL ⊗ PLUGGED & ABANDONED WELL

APPENDIX C. PHOTOGRAPHS

C.1. 170H/171H Photographs

View from the wellheads looking northward

View from the wellheads looking eastward

View from the wellheads looking southward

View from the wellheads looking westward

View to the north along proposed access road (existing two-track road/pipeline corridor), from the northwestern side of proposed well pad.

C.2. 172H/173H Photographs

View from the wellheads, looking northward

View from the wellheads, looking eastward

View from the wellheads, looking southward (Enterprise pipeline working area visible in background)

View from the wellheads, looking westward (residence visible in background)

View from the western corner of the construction zone (corner 3), looking eastward

View from the northern corner of the construction zone (corner 5), looking southward

View from the eastern corner of the construction zone (corner 6), looking westward

View from the southern corner of the construction zone (corner 2), looking northward (Enterprise pipeline working area visible in foreground)

View of access road, from southern end (adjacent to U.S. Highway 550) looking northward (existing roadway apparent)

View of access road, from northern end (adjacent to well pad) looking southward (Enterprise pipeline working area visible in background)

APPENDIX D. SURFACE RECLAMATION PLANS

D.1. 170H/171H Surface Reclamation Plan

D.2. 172H/173H Surface Reclamation Plan