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Encana Oil and Gas (USA) Inc.'s Lybrook P12-2206 Nos. 01H and 02H Oil and Natural Gas Wells Project

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1. PURPOSE AND NEED FOR ACTION

1.1. Background

Encana Oil & Gas (USA) Inc. (Encana) has submitted two Applications for Permit to Drill (APDs) and three Right-of-Way (ROW) Grant applications to the Bureau of Land Management – Farmington Field Office (BLM-FFO) for the Lybrook P12-2206 Nos. 01H and 02H (Lybrook P12) oil and natural gas wells project. The proposed project would consist of two wells and associated facilities. The proposed action is the approval of the APDs and ROW Grants by the BLM-FFO, located in Farmington, New Mexico.

The original Environmental Assessment (EA) for this project, developed in September 2013, also included Encana's proposed Lybrook B14-2206 Nos. 01H and 02H, Lybrook H11-2206 Nos. 01H, 02H, 03H, and 04H, Lybrook M12-2206 No. 01H, and Lybrook N12-2206 No. 01H projects. The Lybrook P12 project included the 01H, 02H, 03H, and 04H wells at the original time of EA development, however in 2015, Encana dropped the 03H and 04H wells from the project. Aside from the Lybrook P12 project, Encana has cancelled or included the aforementioned projects associated with the original EA in different Encana clusters. Therefore, this revised EA has been prepared for the current Lybrook P12 project.

The proposed Lybrook P12 project is located near several Navajo Nation Traditional Cultural Properties (TCPs) and the originally proposed access road and well-connect pipeline corridor accessed the proposed well pad from the east. In 2014, the proposed access road and well-connect pipeline were rerouted to access the proposed well pad from the north to avoid a surface ownership conflict with the Jicarilla Apache Nation. Encana also began incorporating access road pullout areas to accommodate increased vehicle and equipment traffic in 2014 and added one pullout area to the proposed project.

The proposed project would involve the horizontal drilling, possible production, and final abandonment of two wells that would be drilled to BLM-FFO-managed minerals from the Lybrook Gallup formation (Lease No. NMNM 109390). The proposed wells would each be permitted under an approved APD issued by the BLM-FFO. The proposed project would involve the construction, usage, and reclamation of a 6.8 acre well pad (including construction zone), a 1,953-foot access road, and a 2,209-foot well-connect pipeline corridor. These proposed surface features would each be authorized by a ROW Grant approved by the BLM-FFO. The access road would also include the construction of one associated pullout area.

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

Taxes and royalties on oil, natural gas, and carbon dioxide production contribute approximately 25 percent to New Mexico's general fund, and the oil and gas industry is one of the largest private sector

employers in the State of New Mexico (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 area is located within the San Juan Basin in Sandoval County, New Mexico. The proposed project area is approximately 50 aerial miles southeast of the town of Bloomfield, New Mexico, 4 miles southeast of the community of Counselor, New Mexico, and 4 miles south of U.S Highway 550 (see Figure A.1, Appendix A).

1.2. Purpose and Need for Action

The purpose of the proposed action is to allow Encana reasonable access to BLM-managed lands to develop their Federal 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.), and the Federal Land Policy and Management Act of 1976 (FLPMA, 43 USC 1701 et seq.). The MLA 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. The FLPMA authorizes the BLM to grant, issue, or renew ROW Grants over public lands for multiple uses. 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. Per 43 Code of Federal Regulations (CFR) 3160 (Onshore Oil and Gas Operations), the BLM is required to respond to a request for APDs and ROW Grants.

1.3. Decision to be Made

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

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

1.4. Conformance with Applicable Land Use Plan(s)

The proposed action is in conformance with the September 2003 BLM-FFO Resource Management Plan (RMP), with Record of Decision (ROD; BLM 2003b) as updated in December 2003. Pursuant to 40 CFR 1508.28 and 1502.21, this site-specific Environmental Assessment (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 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, including access roads and well-connect pipeline corridors, 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

Encana would comply with applicable Federal, State, and local laws and regulations. Necessary permits and approvals for the proposed project would be obtained prior to project implementation.

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

1.5.1. Clean Water Act

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

Section 401

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).

Section 402

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.

Section 404

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.) within the BLM-FFO planning area may include U.S. Geological Survey (USGS) watercourses (i.e., “blue lines” on USGS 1:24,000 topographic maps) and potentially tributaries to these USGS watercourses.

The proposed Lybrook P12 access road and well-connect pipeline corridor would cross one USGS watercourses that empties into an existing stock pond located approximately 60 feet north of the northeastern corner of the proposed well pad and construction zone. This erosional and ephemeral wash was determined to be non-jurisdictional based on field observations and measurements. If the aforementioned watercourse is considered jurisdictional by the USACE, proposed project activities associated with the crossings would be permitted under Nationwide Permit No. 12 (for Utility Line Activities) and Nationwide Permit No. 14 (for Linear Transportation Projects). The existing stock pond

would be maintained (cleared and excavated) during the proposed construction phase of the project. The proposed stock pond maintenance activities would meet the requirement to be covered under USACE Nationwide Permit No. 3 (for Maintenance Projects).

1.5.2. National Historic Preservation Act

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

1.5.3. Clean Air Act

The Clean Air Act of 1972, as amended (CAA; 42 USC 7401 et seq.), establishes national ambient air quality standards (NAAQS) to control air pollution. In New Mexico, the NMED has adopted most of the CAA into the New Mexico Administrative Code (NMAC). 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 Encana 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).

Pre-disturbance onsite meetings for the proposed projects in the original EA were attended by Encana, BLM-FFO representatives, and an environmental consultant (Nelson Consulting, Inc. [NCI]), on the following dates:

- Lybrook B14-2206 Nos. 01H and 02H: September 4, 2013
- Lybrook H11-2206 Nos. 01H, 02H, 03H, and 04H: March 19, 2013
- Lybrook M12-2206 No. 01H and Lybrook N12-2206 No. 01H: July 9, 2013

- Lybrook P12-2206 Nos. 01H, 02H, 03H, and 04H: March 20, 2013

The local Chapter House of the Navajo Nation was invited to the pre-disturbance onsite meetings by the BLM-FFO. Interdisciplinary Team meetings were held for the proposed projects in the original EA in March, July, and September of 2013 to discuss the original proposed action.

In July 2013, the Navajo Nation was contacted by the BLM-FFO regarding a TCP (the *Tse Dik'a*) associated with a mesa located directly west-southwest of the originally proposed Lybrook N12-2206 No. 01H project area. In September 2013, the Navajo Nation was contacted by the BLM-FFO regarding the *Biih Bidzii* (Deer Stronghold) TCP located adjacent to the originally proposed Lybrook B14-2206 Nos. 01H and 02H project area. In July 2014, officials from the Navajo Nation Historic Preservation Department visited the proposed projects.

A pre-disturbance onsite meeting for the current Lybrook P12 project area was held with the BLM-FFO, Encana, and NCI on July 9, 2014. No Chapter House of the Navajo Nation was invited to the pre-disturbance onsite meeting by the BLM-FFO. A pre-disturbance onsite meeting to address TCPs was held with the BLM-FFO, Encana, NCI, and the Navajo Nation Historic Preservation Department on July 16, 2014, at the onsite meeting it was determined to move the well out-side the TCP. A public invitation to the pre-disturbance onsite meetings was also 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 for the current Lybrook P12 project area on July 21, 2014.

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 to be Analyzed

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

- How would dust and equipment emissions associated with the proposed project impact air resources?
- How would noise levels from the proposed project affect the general vicinity?
- How would vegetation clearing and project activities associated with the proposed well pad, access road, and well-connect pipeline corridor impact soil resources?
- How would the proposed project impact water resources, including groundwater and surface water?
- How would vegetation clearing, proposed project activities, and final reclamation associated with the proposed project 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): Bendire's thrasher (*Toxostoma bendirei*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), pinyon jay (*Gymnorhinus cyanocephalus*), spotted bat (*Euderma maculatum*), and Townsend's big-eared bat (*Corynorhinus townsendii*)?

- How would surface-disturbing activities associated with construction of the proposed project impact cultural resources?
- How would the proposed project impact visual resources?
- How would the proposed project activities impact travel and transportation?
- How would vegetation clearing, proposed project activities, and final reclamation associated with the proposed project impact livestock grazing?
- How would the proposed project activities impact environmental justice?
- How would the proposed project activities impact public health and safety?

1.6.3. 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.

Groundwater Resources

There are no recorded water wells with available depth-to-groundwater data within a 2-mile radius of the proposed well pad or bottom holes (New Mexico Office of the State Engineer 2011). Therefore, depth-to-groundwater in the vicinity of the proposed project areas is unknown.

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

Hydraulic fracturing is a common process in the San Juan Basin and applied to nearly all wells drilled. The producing zone targeted by the proposed action is well below any underground sources of drinking water. The Mancos Shale formation is also overlain by a continuous confining layer. The geological confining layer is the Lewis Shale formation that is located above both the Mancos Shale and Mesaverde formations and provides an impermeable layer that isolates the Mancos Shale and Mesaverde formations from both identified sources of drinking water and surface water. On average, total depth of the proposed wellbore would be about 5,000 feet below the ground surface. Fracturing in the Basin Mancos formation is not expected to occur above depths of 4,000 feet below the ground surface. Fracturing could possibly extend into the Mesaverde formation overlying the Basin Mancos; however, the formation has not been identified as an underground source of drinking water based on its depth and relative high levels of Total Dissolved Solids (TDSs). No impacts to surface water or freshwater-bearing groundwater aquifers are expected to occur from hydraulic fracturing of the proposed wells.

Riparian Areas

Riparian areas generally occur as natural buffers between uplands and adjacent water- bodies (EPA 2005). According to the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory Wetland Mapper (2012), no riparian areas are mapped within the proposed project area. During the March 2013 and July 2015 on-site meetings, NCI biologists experienced in the identification of riparian areas determined that no riparian areas were present within or adjacent to the proposed project area. No riparian vegetation was identified along the ephemeral drainages referenced above in Section 1.5.1 (Clean Water Act). Therefore, it was determined that no riparian areas would be impacted by the proposed project.

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 Sandoval County (USFWS 2015), as well as the location of the proposed project area and habitat within the proposed project area, the potential does not exist for USFWS-listed species to occur within the proposed project area. Water for drilling would be obtained from the permitted Blanco Trading Post SJ-2105 water well; no unaccounted-for water depletions within USFWS-listed fish habitat would occur. Therefore, there is no need for additional Section 7 consultation.

2. PROPOSED ACTION AND ALTERNATIVE(S)

2.1. Alternative A: No Action

Under this alternative, the APDs would not be approved and the ROW Grants would not be issued. The proposed wells would not be drilled and the proposed well pad (including construction zone), access road (including pullout area), and well-connect pipeline corridor would not be constructed. Current land and resource use would continue to occur in the proposed project area.

2.2. Alternative B: Proposed Action

The proposed action is the BLM-FFO approval of two APDs and three ROW Grants associated with Encana's proposed Lybrook P12 project. The proposed project would include the drilling, production, and final abandonment of two oil and natural gas wells and the construction, use, and reclamation of an associated well pad (including construction zone), access road (including pullout area), and well-connect pipeline corridor.

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 project would take place upon receipt of the APDs and ROW Grants. The scheduled commencement of the proposed project could be delayed based on the issuance date of the approved APDs and ROW Grants or drill rig scheduling.

Construction plats and photographs associated with the proposed project are provided in Appendices B and C, respectively.

2.2.1. Location of Proposed Project Area

The proposed project area is located within the San Juan Basin in Sandoval County, New Mexico. The proposed project area is approximately 50 aerial miles southeast of the town of Bloomfield, New Mexico, 4 miles southeast of the community of Counselor, New Mexico and 4 miles south of U.S. Highway 550.

The general region surrounding the proposed project area is characterized by valleys vegetated by sagebrush shrublands, rolling hills of piñon-juniper woodlands, and mesas with open to dense piñon-juniper woodlands and scattered ponderosa pine (*Pinus ponderosa*) trees. Much of the proposed Lybrook P12 access road and well-connect pipeline corridor follow a reclaimed road. Other existing roads and oil and gas development are located in the general vicinity of the proposed project area. Elevation of the proposed project area ranges from 7,070 to 7,100 feet AMSL. The legal location (New Mexico Principal Meridian) for the proposed project area is provided in the table below.

Table 1. Legal Land Description for Project Features

Facility	Legal Location (New Mexico Principal Meridian)		
	Quarter-Quarter	**Section**	**Township & Range**
Access Road, Pullout Area, & Well-Connect Pipeline	Western ½ of Southeastern ¼	12	Township 22 North, Range 6 West
Well Pad & Construction Zone	Southern ½ of Southeastern ¼		
	Northern ½ of Northeastern ¼	13	

The latitude and longitude and footages of the bottom holes and surface holes (wellheads) locations are provided in the table below.

Table 2. Bottom Hole and Surface Hole Locations for Proposed Wells

Wellhead/ Bottom Hole	Geographical Coordinate System (UTM, NAD83 [1])		Legal Location (New Mexico Principal Meridian)	
	Latitude	Longitude	Footages [2]	Township, Range, Section
01H				
Wellhead	36.145101°	-107.415828°	147 feet FSL 1,225 feet FEL	Township 22 North, Range 6 West, Section 12
Bottom Hole	36.123670°	-107.417958°	2,310 feet FNL 1,730 feet FEL	Township 22 North, Range 6 West, Section 24
02H				
Wellhead	36.145132°	-107.415734°	159 feet FSL 1,197 feet FEL	Township 22 North, Range 6 West, Section 12
Bottom Hole	36.123672°	-107.413456°	2,310 feet FNL 400 feet FEL	Township 22 North, Range 6 West, Section 24

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

Maps and photographs of the proposed project area are provided in Appendices A and C, respectively. The proposed project area is plotted on the Counselor, New Mexico, 7.5-minute USGS quadrangle (Appendix A - Figure A.2) and the 2011 Sandoval County National Agriculture Imagery Program aerial photograph (Appendix A - Figure A.3).

Existing disturbance adjacent to the proposed Lybrook P12 project area consists of the following:

- The proposed well-connect pipeline corridor terminates at the existing Lybrook Trunk No. 1 Phase 1 pipeline in the northwestern quarter of the southeastern quarter of Section 12, Township 22 North, Range 6 West.
- A portion of the proposed well-connect pipeline corridor and access road follow a reclaimed road.
- The proposed access road would begin at an existing road.

The proposed Lybrook P12 project area is located on flat to gently rolling terrain with a northeastern slope towards unnamed tributaries of Venado Canyon Wash.

2.2.2. Description of Proposed Project

For a detailed description of design features and construction practices associated with the proposed project, refer to the APDs and ROW Grant Applications on file at the BLM-FFO. The plats (Appendix B) provide additional details.

Design Features and Best Management Practices

Encana would comply with 43 CFR 3160, Onshore Oil and Gas Orders, and BLM guidance and standards established in *The Gold Book: Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (*The Gold Book*; BLM and U.S. Forest Service [USFS] 2007).

Encana would adhere to the Conditions of Approval (COAs) attached to the approved APDs and stipulations attached to the ROW Grants.

Vehicles would be restricted to proposed disturbance areas and existing areas of surface disturbance, such as existing roads and well pads. Construction and maintenance activities would cease when soil or road surfaces become saturated to the extent that construction equipment is unable to stay within the proposed project area and/or when activities would cause irreparable harm to roads, soils, or streams. If equipment creates ruts deeper than six inches, the soil would be deemed too wet for construction or maintenance. No frozen soils would be used for construction purposes or trench backfilling.

The well location would have informational signs, as required by Onshore Oil and Gas Operations regulations (43 CFR 3160).

The following general design features and best management practices (BMPs) would occur.

Control of Waste

Liquid and solid wastes would be disposed of at an appropriate waste-disposal site. The proposed project area would be maintained in a sanitary condition. Hazardous substances would be handled and disposed of according to Federal law. Waste resulting from construction activities would be removed from the proposed project area and disposed of in an authorized area, such as an approved landfill.

Encana would follow NMOCD “Pit Rule” guidelines and Onshore Order No. 1 (issued under Onshore Oil and Gas Operations [43 CFR 3160]).

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 and stipulations in the approved APDs and ROW Grants, respectively. These cultural resource 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 area and/or establishment of specific construction avoidance zones, and employee education.

Employees, contractors, and sub-contractors associated with the proposed project would be informed by Encana 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, Encana 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 project would disturb more than four acres of vegetation, if construction activities associated with the proposed project would occur during the migratory bird breeding season (May 15 through July 31), a migratory bird nest survey of the 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, Encana 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 area or should any additional SSS (listed by the USFWS or BLM) be observed within the proposed project area prior to or during project implementation, 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.

Wildlife hazards associated with the proposed project would be fenced, covered, and/or contained in storage tanks, as necessary. Per BLM Instruction Memorandum No. 2013-033, if any open pits or tanks are associated with the proposed project, they would be netted to prevent birds from entering them.

As stated above (Control of Waste), Encana would follow “Pit Rule” guidelines and Onshore Order No. 1.

Encana would notify the USFWS upon discovery of a dead or injured migratory bird, bald or golden eagle, or USFWS-listed species within or adjacent to the proposed project area. If the BLM becomes aware of such mortality or injury, the BLM would inform Encana. If Encana fails to notify the USFWS of the mortality or injury, the BLM would notify the USFWS. The BLM and the USFWS would then attempt to determine the cause of mortality and evaluate and identify appropriate mitigation measures to avoid future occurrences.

Livestock grazing operators in the vicinity of the proposed project area would be contacted by Encana at least 10 days prior to construction. Any range improvements (such as fences, gates, cattleguards, or waterlines) that could be impacted by the proposed project would be identified and impacts would be mitigated prior to construction. If any range improvements are damaged during project activities, they would immediately be repaired to their former state or better.

For the proposed pipeline trench, gaps would be made in topsoil and subsoil stockpiles, where necessary, to allow for wildlife or cattle crossings.

No more than the amount of pipeline trench than can be worked on in one day would be open at any given time. The trench would not be left open for more than 24 hours. If a trench is left open overnight, Encana would provide a night guard to monitor the open trench and ensure that no livestock or wildlife becomes trapped.

The ends of the proposed pipeline trench would be sloped (3-to-1, horizontal-to-vertical) each night to allow wildlife and livestock to escape. If present, established wildlife or livestock trails would be left in place as crossovers. Escape ramps or crossovers would be constructed every 1,320 feet within the trench; if active livestock grazing is occurring in the proposed project area, these ramps/crossovers would be constructed every 500 feet. The escape ramps/crossovers would be constructed with a minimum 3-to-1 slope at each end. The escape ramps/crossovers would be a minimum of 10 to 12 feet wide and would not be fenced. The ends of the pipes would be plugged to prevent animals from crawling inside them. Before the trench is closed, it would be inspected for wildlife and livestock. Any trapped wildlife or livestock would be promptly removed and released at least 150 yards from the trench.

Protection of Water Resources

As stated above (Control of Waste), the operator would follow “Pit Rule” guidelines and Onshore Order No. 1.

The watercourse crossed by the proposed well-connect pipeline corridor and access road would be recontoured to original conditions, as near as possible.

Protection of Topsoil

Topsoil, which would be stripped from the surface of the proposed project area during the construction phase of the proposed project, would be stored and protected until it is redistributed during reclamation. The top 6 inches of topsoil would be segregated and wind-rowed along the edge of the proposed access road and well pad construction zone; thereby, topsoil would be stored separately from subsoil material. The topsoil would be free of brush, tree limbs, tree stumps, and root balls, but could include chipped or mulched material that is incorporated into the topsoil stockpile. Topsoil would not be stripped when soils are moisture-saturated or frozen below stripping depth. The topsoil would be used during reclamation, as

described further below (Interim Reclamation) and within the proposed project reclamation plan (Appendix E).

Vehicle/equipment traffic would not be allowed to cross topsoil stockpiles.

If the proposed project area become prone to wind or water erosion, appropriate measures would be taken to prevent topsoil loss. Such measures could include using tackifiers or water to wet the topsoil stockpile so that a crust is created across the exposed soil.

For the proposed pipe trench, the topsoil would not be used for padding the pipes and would not be mixed with excavated subsoil. The excavated subsoil would be stockpiled separately along the edge of the proposed well-connect pipeline corridor. For the proposed well-connect pipeline corridor, gaps would be made in topsoil and subsoil stockpiles, where necessary, to avoid ponding or to divert water during storm events.

Protection of the Public

The hauling of equipment and materials on public roads would comply with Department of Transportation regulations. Any accidents involving persons or property would immediately be reported to the BLM-FFO. Encana would notify the public of potential hazards by posting signage (e.g., trucks turning or construction ahead), having flaggers, or using lighted signs, as necessary.

Worker safety incidents would be reported to the BLM-FFO as required under Notice to Lessees (NTL) - 3A (USGS 1979). Encana would adhere to company safety policies and Occupational Safety and Health Administration (OSHA) regulations. The operator would comply with pipeline safety regulations (49 CFR 190 and 192). The proposed pipeline trench would be excavated and sloped in accordance with OSHA specifications.

The soil stockpiles and pipe string would also be used as safety barriers during construction of the proposed well-connect pipeline corridor. If the pipeline trench is left open at a road crossing, orange safety fencing or barricades would be installed, if needed. During construction, access to the proposed well-connect pipeline corridor would be limited to pipeline construction crews.

Prevention and Control of Weeds

It would be Encana's responsibility to monitor, control, and eradicate all invasive, non-native plant species within the proposed project area throughout the life of the proposed project. Encana would contact the BLM-FFO regarding acceptable weed-control methods. If Encana 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. Encana 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

Production would comply with noise standards outlined in NTL 04-2 FFO (BLM 2004). Encana would adhere to the noise stipulations, if any, included in the COAs attached to the approved APD and/or stipulations attached to the ROW Grants.

Erosion Control

During reclamation, stockpiled rocks, if available, would be placed within the reclamation area for erosion control and/or OHV control (if requested by the BLM-FFO), and/or in a manner that visually blends with the adjacent, undisturbed landscape.

Within the proposed well-connect pipeline corridor, erosion-control features, such as waterbars would be applied as specified by the BLM-FFO Authorized Officer. If waterbars are constructed, they would follow the horizontal contour of the hillslope on which they would be placed. The spacing requirements (by hillslope grade) are provided in the table below.

Table 3. Waterbar Spacing Requirements by Percent Grade of Hillslope

Hillslope Percent Grade (%)	Waterbar Spacing (feet)
Less than 1	400
1-5	300
5-15	200
15-25	100

During the July 9, 2014 pre-disturbance onsite meeting, the following erosion control features were determined as occurring during reclamation:

- Three 24-inch-diameter culverts would be installed along the proposed Lybrook P12 access road at approximate stationing 11+78, 13+51, and 14+75.
- Storm water would be diverted around the proposed Lybrook P12 well pad into an existing stock pond located northeast of the proposed Lybrook P12 well pad.

The placement of other water- and erosion-control features within the proposed project area would be determined during reclamation. Erosion-control features would be applied as specified by the authorized BLM-FFO officer.

Proposed Project Phases

During all project phases, vehicles would use the proposed access road, as well as developed BLM 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).

Refer to the section above (Design Features and Best Management Practices) for resource-protection details associated with all proposed project phases.

Under the proposed action, the following phases would occur.

Construction of Access Road, Pullout Area, and Well Pad

Access road and well pad construction would take two to four weeks at the proposed project site. During construction of the proposed access road, pullout area, and well pad, the following equipment could be utilized onsite: chainsaw, brush hog, scraper, maintainer, excavator, and dozer.

Water diversions and silt traps (if needed) would be installed during interim reclamation; please see the “Design Features and Best Management Practices – Erosion Control,” above and the “Interim Reclamation” section, below. Additional sediment- and/or erosion-control features would be installed, as

necessary. Additional resource-protection design features and mitigation associated with construction are listed above, in “Design Features and Best Management Practices”.

Proposed Well Pad

The proposed well pad would be cleared of vegetation and leveled. Vegetation removed during construction, including trees that measure less than 3 inches in diameter (at ground level) and slash/brush, would be chipped, shredded, or mulched and incorporated into topsoil for later use in interim reclamation. When chipping slash and brush, the “chips” would be distributed in a manner that would not impede seeding with machinery or the establishment of successful revegetation.

The top 6 inches of topsoil would be salvaged and stockpiled within the proposed well pad construction zone. The protection of topsoil is discussed in “Design Features and Best Management Practices – Protection of Topsoil,” above.

The proposed well pad would measure 490 feet by 400 feet, including the 50-foot well pad construction zone around the perimeter of the pad. The maximum well pad cut would be 11.4 feet on the southwestern corner (corner 2) of the proposed well pad. The maximum well pad fill would be 8.7 feet on the northeastern corner (corner 5).

The proposed well pad would be constructed from the native borrow soil and subsoil accumulated during construction activities. The excavated material from well pad cuts would be used on the fill portions of the proposed well pad in order to create a level well pad surface. If additional fill or surfacing material would be needed, Encana would obtain the material from an existing permitted or private source and haul the material by truck utilizing existing access roads. The well pad construction zones could be limited in area if specified by COAs/stipulations attached to the approved APDs and ROW Grants.

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

Proposed Access Road

The proposed access road would be cleared of vegetation and leveled. Vegetation removed during construction, including trees that measure less than 3 inches in diameter (at ground level), would be chipped, shredded, or mulched and incorporated into topsoil for later use in interim reclamation. Slash/brush treatment, topsoil removal, and access road construction would be similar to that described for the well pad, above.

The top 6 inches of topsoil would be salvaged and stockpiled along the proposed access road. The protection of topsoil is discussed in “Design Features and Best Management Practices – Protection of Topsoil,” above.

The proposed access road would be 1,953 feet long. The maximum road grade would be 2 to 3 percent. The 30-foot-wide workspace associated with the proposed access road would include a 14-foot-wide running surface with adequate crowning. The proposed access road would be designed (e.g., drainage design, culvert sizing, and culvert installation) and constructed as a Resource Road in accordance with *The Gold Book* (BLM and USFS 2007) and BLM Manual 9113, Sections 1 and 2 (BLM 2011d and BLM 2011e). If the well is commercially viable, Encana would upgrade the proposed access road, as necessary, to accommodate year-round traffic and meet all-weather standards. The proposed access road would be maintained for the life of the proposed project in accordance with *The Gold Book* (BLM and USFS 2007).

There would be no fence cuts or cattle guards required for the construction of this proposed well pad or access road.

Drilling and Completion

Drilling

Once well pad and access road construction is completed, a drilling rig would be transported to the well pad and assembled. Drilling activities would take place around the clock for approximately two to three weeks per well; during this phase, there would be constant onsite supervision. During drilling, the following equipment would be on site: drilling rig, stockpiles of drill pipe and casing, closed-loop system for collection cuttings and fluid, above-ground tanks for collecting cuttings and fluid, mud shakers to separate cuttings from fluid, generators to provide power to the drill rig, light towers, toilet facilities, trash containers, and office trailers equipped with sleeping quarters for essential personnel.

Water for drilling would be obtained from an existing private water well located in the southwestern quarter of the northeastern quarter of Section 32, Township 25 North, Range 9 West (New Mexico Principal Meridian). The New Mexico Office of the State Engineer-assigned permit number for this water well is SJ-2105 (Blanco Trading Post). Water for drilling would be hauled by truck using existing and proposed access roads.

The proposed project includes two directional wells. The proposed wells would be targeting oil and natural gas within the formation provided in Section 1.1 (Background). The wells would be drilled from the proposed wellheads to the proposed bottom holes provided in Table 2 in Section 2.2.1 (Location of Proposed Project Area).

Utilizing a fresh water-based drilling mud system, the surface casings would be installed at an approximate depth of 500 feet. After a surface casing is installed, the casing would be cemented in place by pumping cement down the casing and circulating the cement back up the outside of the casing to create a cement sheath around the entire casing. The casing would then be tested to ensure the quality and integrity of the cement. The casing and cementing would stabilize the wellbores. In addition, the casing and cementing would isolate hydrocarbon zones from overlying freshwater aquifers, thereby providing protection to any overlying freshwater aquifers.

Prior to drilling below the surface casing, a blowout preventer (BOP) would be installed on the surface casing. The BOP and surface casing would be pressure tested for integrity. After installation and testing of the BOP, a string of intermediate casing would be installed. The intermediate casing would then be cemented and tested to ensure the quality and integrity of the cement.

Once the intermediate string is cemented, a synthetic oil-based and/or freshwater-based drilling mud system would be used to drill the horizontal portion of the wellbores. A downhole mud motor would be used to increase the penetration rate during drilling. The drill rig would pump drilling fluids to drive the mud motor, cool the drill bit, and remove cuttings from the wellbores. Additives could be mixed with the mud system to achieve borehole stability, minimize potential damage to geologic formations, provide adequate viscosity to carry the drill cuttings out of the wellbores, and reduce downhole fluid losses.

After the wellbores have been drilled to their final depth, production liners would be installed and secured into place utilizing an external swell packer system. The production liners would provide additional isolation of the wellbores and create a pathway for oil and natural gas to travel from mineral formation to the surface.

Completion

After the production liner has been secured into place, the drilling rig would be removed from the proposed well pad, and a completion rig would be moved to the proposed well pad. Completion is the process in which a well is enabled to produce oil and natural gas. Completion typically takes one to two weeks for each well. During completion, the following equipment would be onsite: completions rig, completions command center, steel storage tanks, pump trucks and transports, blending and mixing facilities, and related ancillary completions equipment.

A completion rig would run a completion string into a wellbore for tying it into the liner/liner hanger. The completion string would be of the same size, weight, and grade as the production liner. The completions

string tie in would provide a secondary barrier during completion operations for protecting the intermediate casing from pressures needed to pump into the formation.

Completion would require hydraulic fracturing, which is the process of injecting water, sand, and a small amount of fluid additives into the wellbores, under very high pressure, to fracture the targeted formations and release oil and natural gas. During this process, within the horizontal portion of the wellbores, a series of charges would be set through the producing interval to perforate the production liner and casing and create small fractures in the formation. A fluid and sand mixture would be injected into the formation, at high pressure, to create cracks or fractures. The sand would keep the fractures open and allow oil and natural gas to move more efficiently into the wellbores. The hydraulic fracturing process utilizes a series of plugs to isolate portions of a well that have been fractured. Once hydraulic fracturing has been completed, these plugs would be drilled out to allow the oil and natural gas to flow to the wellheads.

The completions would be designed with nitrogen foam for minimizing water usage and improving fluid recoveries following the completion phase. Water for completions would be obtained from the existing private water well (SJ-2105 [Blanco Trading Post]) described above and trucked to the locations. Water would be stored in steel storage tanks within the proposed project area. After the completion phase, a portion of the water injected for hydraulic fracturing would flow back to the wellhead and be collected in steel storage tanks stationed within the proposed project area. This flowback water would be disposed of at a State of New Mexico-permitted wastewater facility.

The final step of the completion phase would be the installation of tubing in the wellbores. This tubing would enhance production by creating a more efficient path for oil and natural gas to travel to the wellheads. At the wellheads, the flow of oil and natural gas would be regulated and controlled by a series of valves and instruments.

Construction of Well-Connect Pipeline

If the proposed well proves to be productive, one well-connect pipeline would be constructed and installed to carry oil and natural gas from the proposed wells to Encana pipeline systems; the lifetime of the well-connect pipeline is anticipated to be 30 to 50 years. Pipeline construction would take three to four weeks for the proposed project location.

The proposed well-connect pipeline would be up to 6-inch-diameter steel pipes. The well-connect pipeline ROW corridor would be 40 feet in width. The length of the well-connect pipeline is 2,209 feet.

The maximum allowable operating pressure of the proposed well-connect pipeline would be 500 pounds per square inch gauge. Additional, related aboveground appurtenances (i.e., cathodic protection equipment, futures, and block valves with blowdowns) would be installed within the well-connect pipeline corridor. Equipment that would be subject to safety requirements would not be painted Covert Green.

For the proposed well-connect pipeline corridor, site preparation would include clearing vegetation from the proposed corridor, salvaging and stockpiling topsoil, and excavating the pipe trench. The site preparation activities would be limited to the minimum area required for safe and efficient construction.

Vegetation clearing activities would be similar to those described in the “Proposed Project Phases - Construction of Access Road, Pullout Area, and Well Pad” section, above. Topsoil would be stockpiled along the edge of the proposed well-connect pipeline corridor.

For the proposed pipe trench, the cover from the top of the pipe to ground level would be a minimum of 36 inches deep when located within typically encountered soil and rock and a minimum of 48 inches deep at road crossings. Where rock is encountered within the pipe trench, tractor-mounted mechanical rippers or rock trenching equipment could be used during trenching excavation activities.

Proposed well-connect pipeline corridor construction and installation would include stringing the pipe, bending the pipe for horizontal or vertical angles in the pipeline alignment, welding pipeline segments together, inspecting the pipe, coating the pipe to prevent corrosion, and lowering the pipe into the trench.

The pipe inspection would include the verification that the minimum pipe cover has been provided, the trench bottom is free of rocks/debris, the external pipe coating has not been damaged, and the pipe has been properly fitted and installed in the trench. The fine soil would be sifted from the subsoil stockpile in order to provide rock-free pipeline padding and bedding. In rocky areas, a padding material or rock shield would be used to protect the pipe. After a section of pipe has been lowered into the pipeline trench and inspected, the pipeline trench would be backfilled. Once the pipeline trench has been backfilled, cleanup activities would be initiated and interim reclamation would take place within the workspace, as described in the following section (Interim Reclamation) and within the proposed project reclamation plan (Appendix E).

Additional resource-protection design features and mitigation associated with construction are listed above, in “Design Features and Best Management Practices”.

Interim Reclamation

If the wells associated with the proposed project prove to be productive, portions of the proposed project area that would not be required for production (non-working areas [areas not necessary for the routine, long-term operation and maintenance of an authorized site]) would be reclaimed. Interim reclamation would be initiated within 120 days of construction. Interim reclamation would take two to four weeks for the project’s well pad, access road, and pullout area. Interim reclamation would take one week for the well-connect pipeline corridor. The BLM-FFO would be notified at least 48 hours prior to the start of interim reclamation activities at each location. Interim reclamation could occur simultaneously with production.

During interim reclamation, the following equipment could be utilized onsite: pick-up trucks, dozer, blade, farm tractor with a disc, trackhoe, and scraper.

Areas reclaimed during interim reclamation would include the project features described in Section 2.2.3 (Proposed Surface Disturbance), below. Approximately 7.4 acres of new surface disturbance would be reclaimed at this time.

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

Water- and erosion-control features would be installed within the proposed project area as described in “Design Features and Best Management Practices – Erosion Control.” Additional water diversions, if needed, would be installed at this time.

Reclaimed areas would be seeded using the Sagebrush/Grass Community Seed Mixture.

The reclamation standards would comply with BLM-FFO Bare Soil Reclamation Procedure B (BLM 2013). Details of the interim reclamation process are provided in the reclamation plan (Appendix D).

Under the BLM-FFO Bare Soil Reclamation Procedures (BLM 2013), Encana and the BLM-FFO would monitor reclaimed surfaces to document successful interim reclamation; monitoring and reporting are discussed in the reclamation plan (Appendix E)

Production

The production phase of wells varies; the lifetime is anticipated to be 30 to 50 years. The installation of production equipment would take approximately three to four weeks at the project location. The proposed access road and the working areas of the proposed well pad would be maintained for the life of the proposed project.

Production equipment that would remain on the well pad during production would include the following: wellheads, metering units, separators, aboveground condensate tanks, water tanks (tank battery),

meter(s), and VRU compressor(s). If artificial lift would be required, pump jack(s) and/or gas skid lift(s) would also be installed.

The tank batteries would be placed within corrugated steel secondary containment berms that would be sized to contain a minimum of 110 percent of the storage capacity of the largest tank within the bermed area. Containment berms would include an impermeable liner attached to the rings and laid under the tanks. All loading lines would also be placed inside the containment berms or would have secondary containment vessels.

At the proposed well sites, site security guidelines would be followed, as identified in 43 CFR 3162.7-5 and Onshore Oil and Gas Order No. 3. Production facilities would be painted Covert Green to blend with the natural environment. Equipment that would be subject to safety requirements would not be painted Covert Green. Production facilities would be placed, to the extent practical, to minimize visual impacts.

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

Final Reclamation and Abandonment

If the wells prove to be unproductive, or when the wells are no longer commercially viable, the wells would be abandoned and final reclamation would take place. The final abandonment phase typically takes two to four weeks.

During final reclamation, the following equipment could be utilized onsite: dozer, blade, farm tractor with a disc, trackhoe, and scraper.

Encana would provide the BLM-FFO with technical and environmental aspects of the final plugging, abandonment, and reclamation procedures.

Downhole well abandonment would be carried out under current BLM-FFO and State regulations. The bores 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 contain individual well identification information.

The underground well-connect pipeline would typically be plugged and left in place.

If the BLM-FFO considers the retention of the proposed well pad and/or access road, as well as existing access road(s) to the locations, necessary for the management and multiple uses of natural resources, they would be reclaimed. The goal of final reclamation would be to return the disturbed areas associated with the proposed project to pre-construction conditions, if possible, by diminishing the evidence of cuts, fills, and flat well pad surfaces. Disturbed areas would be re-contoured to pre-construction topographical contours, covered with salvaged topsoil, and seeded. Erosion control measures, if needed, would be installed at this time.

Reclaimed areas would be seeded using the Sagebrush/Grass Community Seed Mixture.

The reclamation standards would comply with BLM-FFO Bare Soil Reclamation Procedure (BLM 2013). Details of the interim reclamation process are provided in the reclamation plan (Appendix E).

Under the BLM-FFO Bare Soil Reclamation Procedures (BLM 2013), Encana and the BLM-FFO would monitor reclaimed surfaces for the portions of the proposed project located on BLM-FFO-managed surface to document successful final reclamation; monitoring and reporting are discussed in the reclamation plan (Appendix E).

2.2.3. Proposed Surface Disturbance

New surface disturbance associated with the proposed Lybrook P12 would total 9.4 acres. Of this, 6.5 acres would be reclaimed during interim reclamation, 0.9 acre would be reseeded (but not recountoured), and 2.0 acres would remain disturbed throughout the life of the proposed project. All portions of the project area that are not fully reclaimed during interim reclamation would be reclaimed when the wells are finally abandoned. This disturbance is summarized in the table below. Individual proposed project disturbances are summarized in the sub-sections below.

Table 4. Surface Disturbance Associated with Proposed Project

Feature	Acreage		Description of New Disturbance Acreage Following Interim Reclamation		
	Total	New Disturbance	Fully Reclaimed (Reseeded and Recontoured)	Reseed Only*	Unreclaimed*
Access Road	1.4	1.4	-	0.8	0.6
Pullout Area	0.1	0.1	-	0.1	< 0.1
Well Pad	4.5	4.5	3.1	-	1.4
Well Pad Construction Zone	2.3	2.3	2.3	-	-
Well-Connect Pipeline Corridor	2.0	1.1	1.1	-	-
Total	**10.3**	**9.4**	**6.5**	**0.9**	**2.0**
*This acreage would be fully reclaimed during final reclamation.					

Access Road

The access road corridor would be 1,953 feet long and 30 feet wide (1.4 acres). Approximately 587 feet of the access road corridor follows a reclaimed road. However, since the existing disturbance has been reclaimed, the entire access road corridor would be considered new disturbance.

- The 14-foot-wide running surface of the road and the bottoms of the bar ditches alongside the road (0.6 acre) would remain disturbed for the lifetime of the project. This acreage would be reclaimed during final reclamation.

- The remainder of the access road corridor (0.8 acre) would be reseeded during interim reclamation and fully reclaimed during final reclamation.

Pullout Area

A pullout area would be constructed along the proposed access road and would be 100 feet long with 25 feet on each end (150 feet total) for entering and exiting the pullout area. The pullout area would be located at approximate stationing 7+47 to 8+97.

- The 10-foot-wide running surface of the access road pullout area (less than 0.1 acre) would remain disturbed for the lifetime of the proposed project. This acreage would be reclaimed during final reclamation.

- The maximum width of 20 feet to allow construction and sloping (0.1 acre) of the access road pullout area would be reseeded during interim reclamation and fully reclaimed during final reclamation.

Well Pad

The well pad would measure 400 by 490 feet (4.5 acres).

- The working area, which would measure 250 by 250 feet (1.4 acres), would remain disturbed until final reclamation, when the wells are abandoned.

- The remainder of the well pad (3.1 acres) would be fully reclaimed during interim reclamation.

Well Pad Construction Zone

A 50-foot-wide (2.3-acre) construction zone would surround the well pad. Less than 0.1 acre of the construction zone would overlap the proposed Lybrook P12 access road. Therefore, the construction zone would result in 2.3 acres of new surface disturbance.

All new surface disturbance associated with the construction zone would be fully reclaimed during interim reclamation.

Well-Connect Pipeline Corridor

The well-connect pipeline corridor would be 2,209 feet long and 40 feet wide (2.0 acres) and connect to Encana's Lybrook Trunk No.1 Phase 1 well-connect pipeline in the northwestern quarter of the southeastern corner of Section 12, Township 22 North, Range 6 West. Portions of the proposed well-connect pipeline corridor would overlap previously existing disturbance and disturbance associated with other portions of the proposed Lybrook P12 project (described below). Therefore, new surface disturbance associated with the proposed well-connect pipeline corridor would be 1.1 acres. All of this disturbance would be fully reclaimed during interim reclamation.

- Approximately 262 feet of the well-connect pipeline corridor length would overlap the proposed Lybrook P12 well pad and construction zone. There would be no new surface disturbance associated with this portion of the well-connect pipeline corridor.

- Approximately 1,932 feet of the well-connect pipeline corridor length would travel parallel and adjacent to the proposed access road. Where the well-connect pipeline corridor parallels the proposed access road, approximately 15 feet of the well-connect pipeline corridor would overlap the proposed access road. Therefore, there would be 1.1 acres of new surface disturbance associated with this portion of the well-connect pipeline corridor.

- Approximately 15 feet of the well-connect pipeline corridor length would travel underneath an existing road and connect to the Lybrook Trunk No.1 Phase 1 pipeline. There would be no new surface disturbance associated with this portion of the well-connect pipeline corridor.

2.3. Alternatives Considered but Eliminated from Detailed Study

Oil and natural gas 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.

The proposed wells would be horizontally drilled. No feasible alternative surface locations were identified for the proposed wells that would result in less surface disturbance than the proposed location. The originally proposed access road and well-connect pipeline corridor accessed the proposed well pad from

the east, but due to surface ownership conflicts with the Jicarilla Apache Nation, the currently proposed access road and well-connect pipeline corridor access the proposed well pad from the north.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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

3.1. Air Resources

3.1.1. Affected Environment

The proposed wells are located in Sandoval County, New Mexico. Additional general information on air quality in the area is contained in Chapter 3 of the BLM-FFO PRMP/FEIS (BLM 2003a, 3-48 – 3-53). In addition, new information about greenhouse gases (GHGs), and their effects on national and global climate conditions has emerged since this document was prepared. On-going scientific research has identified the potential impacts of GHG emissions such as carbon dioxide (CO_2) methane (CH_4); nitrous oxide (N_2O); water vapor; and several trace gases on global climate. Through complex interactions on a global scale, GHG emissions may cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and burning of fossil carbon sources have caused GHG concentrations to increase measurably, and may contribute to overall climatic changes, typically referred to as global warming.

Much of the information referenced in this section is incorporated from the Air Resources Technical Report for BLM Oil and Gas Development in New Mexico, Kansas, Oklahoma, and Texas (herein referred to as Air Resources Technical Report; BLM 2014). This document summarizes the technical information related to air resources and climate change associated with oil and gas development and the methodology and assumptions used for analysis.

The EPA has the primary responsibility for regulating air quality, including six nationally regulated ambient air pollutants (criteria pollutants). These criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). EPA has established National Ambient Air Quality Standards (NAAQS) for criteria air pollutants. The NAAQS are protective of human health and the environment. EPA has approved New Mexico's State Implementation Plan and the state enforces state and federal air quality regulations on all public and private lands within the state, except for tribal lands and within Bernalillo County. Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology and terrain, and also includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. EPA has proposed or completed actions recently to implement CAA requirements for GHG emissions. Climate has potential to influence renewable and non-renewable resource management.

Air Quality

Criteria Air Pollutants

The Air Resources Technical Report describes the types of data used for description of the existing conditions of criteria pollutants, how the criteria pollutants are related to the activities involved in oil and gas development, and provides a table of current National and state standards. EPA's Green Book web page (EPA 2013b) reports that all counties in the Farmington Field Office area are in attainment of all NAAQS as defined by the CAA. The area is also in attainment of all New Mexico Ambient Air Quality Standards (NMAAQS). The current status of criteria pollutant levels in the BLM-FFO are described below.

"Design Values" are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. The 2012 design values for criteria pollutants are listed below in Table 5. There is no monitoring for CO and lead in San Juan County, but because the county is relatively rural, it is likely that these pollutants are not elevated. PM10 design concentrations are not available for San Juan County.

Table 5. 2012 Criteria Pollutant Monitored Values in San Juan County

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

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

In 2005, the EPA estimates that there was less than 0.01 ton per square mile of lead emitted in FFO counties, which is less than 2 tons total (EPA 2012). Lead emissions are not an issue in this area, and will not be discussed further.

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

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

Although the AQI in the region has reached the level considered unhealthy for sensitive groups on several days almost every year in the last decade, there are no patterns or trends to the occurrences (Table 6). On eight days in the past decade, air quality has reached the level of "unhealthy" and on two days, air quality reached the level of "very unhealthy". In 2009 and 2012, there were no days that were "unhealthy for sensitive groups" or worse in air quality. In 2005 and 2013, there was one day that was "unhealthy" during each year. In 2010, there were five "unhealthy" days and two "very unhealthy days".

Table 6. Number of days classified as "unhealthy for sensitive groups" (AQI 101-150) or worse

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

Source: EPA 2013a

Hazardous Air Pollutants

The Air Resources Technical Report discusses the relevance of hazardous air pollutants (HAPs) to oil and gas development and the particular HAPs that are regulated in relation to these activities (BLM 2014). The EPA conducts a periodic National Air Toxics Assessment (NATA) that quantifies HAP emissions by county in the U.S. The purpose of the NATA is to identify areas where HAP emissions result in high health risks and further emissions reduction strategies are necessary. A review of the results of

the 2005 NATA shows that cancer, neurological and respiratory risks in San Juan County are generally lower than statewide and national levels as well as those for Bernalillo County where urban sources are concentrated in the Albuquerque area (EPA 2012).

Climate

The analysis area is located in a semiarid climate regime typified by dry windy conditions and limited rainfall. Summer maximum temperatures are generally in the range of 80 or 90 degrees Fahrenheit (°F), and winter minimum temperatures are generally in the teens to 20s. Temperatures occasionally reach above 100°F in June and July and have dipped below zero in December and January. Precipitation is divided between summer thunderstorms associated with the southwest monsoon and winter snowfall as Pacific weather systems drop south into New Mexico. Table 7 shows climate normals for the 30-year period from 1981 to 2010 for the Farmington, New Mexico, area.

Table 7. Climate Normals for the Farmington Area, 1981-2010

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

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

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

3.1.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. No new impacts on ambient air pollution and GHG emissions would occur.

3.1.3. Impacts from Alternative B: Proposed Action

Methodology and assumptions for calculating air pollutant and GHG emissions are described in the Air Resources Technical Report (BLM 2014). This document incorporates the sections discussing the modification of calculators developed by the BLM to address emissions for one horizontal oil well. The calculators give an approximation of criteria pollutant, HAP, and GHG emissions to be compared to regional and national emissions levels. Also incorporated into this document are the sections describing the assumptions used in developing the inputs for the calculator (BLM 2014).

Direct and Indirect Impacts

Criteria Pollutants

Table 8 shows estimated emissions from one proposed horizontal oil well for criteria pollutants, VOCs and GHGs. For comparison, Table 9 shows total human-caused emissions for each of the counties in the BLM-FFO and La Plata County, Colorado, based on the EPA's 2011 emissions inventory (EPA 2014b).

Table 8. Criteria Pollutant and VOC Emissions Estimated for Construction of One Horizontal Oil Well; Average 25 Days to Drill and Complete

Activity	NOx	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	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**

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

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

Table 9. Analysis Area Emissions in Tons/Year, 2011

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

(1) NO_X – nitrogen oxides
(2) CO – carbon monoxide
(3) VOC – volatile organic compounds
(4) PM_{10} – particulate matter with an aerodynamic diameter equal to or less than 10 microns
(5) $PM_{2.5}$ – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
(6) SO_2 – sulfur dioxide

Table 10 displays the percent increase in total emissions in the analysis area from the proposed action to construct and operate one horizontal oil well.

Table 10. Percent Increase in Analysis Area Emissions from the Proposed Action

	NO_X(1)	CO(2)	VOC(3)	PM_{10}(4,5)	$PM_{2.5}$(5,6)	SO_2(5,7)
Total Emissions	75,187.7	144,551.5	57,265.1	222,168.9	26,407.2	7,237.9
Horizontal Gas Well Emissions	6.28	1.94	0.65	2.55	0.30	0.13
Percent Increase	**0.008**	**0.001**	**0.001**	**0.001**	**0.001**	**0.002**

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

Hazardous Air Pollutants

The formulas used for calculating HAPs in the calculators are very imprecise. For many processes it is assumed that emission of HAPs will be equivalent to 10 percent of VOC emissions. Therefore, the estimated HAP emissions of 1.25 tons/year should be considered a very gross estimate. Most of the VOC emissions estimated for one horizontal oil well result from venting from oil storage tanks. Current EPA regulations require operators to reduce VOC emissions by 95% if their oil storage tanks emit over 6 tons of VOC emissions per year. A reduction of 95% of oil storage tank VOC emissions would reduce the estimated HAP emissions to 0.12 tons/year.

Total Greenhouse Gases

The available statewide GHG summary combines GHG emissions from CO_2 and CH_4. To compare the GHG emissions from the Proposed Action estimated by the calculator with statewide GHG emissions, CO_2e emissions for both CH_4 and CO_2 were summed. The total statewide GHG emission estimate for 2007 was 76,200,000 metric tons CO_2e (76.2 million metric tons (NMED 2010). The estimated CO_2e metric tons emissions from one 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 21,150 active oil and gas wells in the San Juan Basin. About 14,843 of the wells in these counties are Federal wells. Analysis of cumulative impacts for reasonable development scenarios and reasonably foreseeable development scenarios of oil and gas wells on public lands in the BLM-FFO was presented in the 2003 RMP. This included modeling of impacts on air quality. A more detailed discussion of cumulative effects can be found in the Air Resources Technical Report (BLM 2014).

The primary activities that contribute to levels of air pollutant and GHG emissions in the Four Corners area are electricity generation stations, fossil fuel industries, and vehicle travel. The Air Quality Technical Report includes a description of the varied sources of national and regional emissions that are incorporated here to represent the past, present, and reasonably foreseeable impacts to air resources (BLM 2014). It includes a summary of emissions on the national and regional scale by industry source. Sources that are considered to have notable contributions to air quality impacts and GHG emissions include electrical generating units, fossil fuel production (nationally and regionally), and transportation.

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

The very small increase in GHG emissions that could result from implementing the proposed alternative would not produce climate change impacts that differ from the No Action Alternative. This is because climate change is a global process that is impacted by the sum total of GHGs in the Earth's atmosphere. The incremental contribution to global GHGs from the action alternatives cannot be translated into effects on climate change globally or in the area of this site-specific action. It is currently not feasible to predict with certainty the net impacts from the action alternatives on global or regional climate.

The Air Resources Technical Report (BLM 2014) discusses the relationship of past, present, and future predicted emissions to climate change and the limitations in predicting local and regional impacts related to emissions. It is currently not feasible to know with certainty the net impacts from particular emissions associated with activities on public lands.

3.2. Noise

3.2.1 Affected Environment

Increases in noise have the potential to affect natural resource values and management in BLM SDAs, such as Special Management Areas (SMAs), Areas of Critical Environmental Concern (ACECs), and Research Natural Areas (RNAs). The BLM has designated certain areas within the BLM-FFO planning area as Noise Sensitive Areas (NSAs), which include some visitor use areas, wilderness areas, semi-private recreation areas, habitat for Threatened or Endangered species, raptor nesting/roosting sites, recreational trails, and sites where people live and work. Within NSAs, noise-control measures are either receptor or boundary focused, as determined by BLM-FFO management guidelines for each NSA.

According to NTL 04-2 FFO, for oil and gas operations that operate on a continual (greater than 8 hours per day), long-term (greater than one week in duration) basis, sound levels at designated receptors or boundaries must be less than or equal to 48.6 A-weighted decibels (dBA) over a continuous 24-hour period. The NTL 04-2 FFO sound level requirement does not apply to transient operations (e.g., construction, drilling, completion, workover activities), short-term events (e.g., venting a well, compressor start-ups), or temporary non-oil and gas sound sources. The NTL 04-2 FFO provides further detail on noise standards related to oil and gas activities (BLM 2004).

The proposed project area is not located within 400 feet of an NSA (BLM 2003c); within 100 feet of an occupied dwelling or building, or within an incorporated city or township. The proposed project area is

located approximately 8.2 miles south of a NSA (BLM 2003c), approximately 2.1 miles east-northeast of an occupied dwelling or building, and approximately 4.9 aerial miles south-southeast of the town of Counselor, NM. Currently, noise levels within the proposed project area are relatively low. Nearby oil- and gas-operation equipment can be heard from the proposed project area.

3.2.1. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. Sound levels within NSAs, occupied dwellings/buildings, or incorporated cities or townships would not be affected by the proposed project.

3.2.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Sound levels within NSAs, occupied dwellings/buildings, or incorporated cities or townships would not be affected by the proposed project. In the vicinity of the proposed project area, a moderate, short-term noise increase and a low, long-term noise increase would be anticipated as a result of the proposed project.

Continual (more than eight hours per day), long-term (longer than one week) project operations would not result in an exceedance of 48.6 dBA over a continuous 24-hour period within NSAs. During the construction phase of the proposed project, construction machinery and vehicles would generate noise, during daylight hours, for a period of approximately three to four weeks. Nighttime noise levels would not be expected to be altered by the proposed project.

During the construction and drilling phases of the proposed project, sound levels would be elevated above pre-existing levels for 24 hours per day. During the operation phase of the proposed project, noise levels would vary depending on equipment used for the proposed project. Operational noise could be produced by oil and gas equipment, such as compressors and pump jacks, and by vehicles periodically visiting the well site for maintenance activities. Noise levels associated with oil and gas activities are described above (Section 2.2.2. Description of Proposed Project – Noise) and in the PRMP/FEIS (2003a).

Cumulative Impacts

The spatial analysis area for cumulative noise impacts is the BLM-FFO planning area. Increases in the level of sound generated from the extraction, production, and transportation of oil and gas has occurred in the San Juan Basin over the last several decades. Noise from oil and gas compressors has been identified by the public as an issue of primary concern in the BLM-FFO area (BLM 2003a, 3-92; BLM 2004). Increased sound levels are associated with oil- and gas- operation activities, including well drilling, pump jack operations, produced water injection facilities, and gas compressor facilities. These sound levels range from 71 to 89 decibels, as weighed to reflect human hearing sensitivities to particular frequencies (A-weighted dBA). These sound levels are estimated at a distance of 50 feet from the noise source. Sound levels above approximately 120 A-weighted dBA begin to be registered as uncomfortable to the human ear (BLM 2003a, 3-92). The proposed project would contribute minimally to the overall noise cumulative impacts in the San Juan Basin.

3.3. Soil Resources

3.3.1. 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) has mapped the soils in the proposed project areas. Complete soil information is available in the NRCS's *Soil Survey of Sandoval County, New Mexico: Parts of Los Alamos, Sandoval, and Rio Arriba Counties* (NRCS 2008). Within the proposed project area, two soil map units are present: Orlie-Sparham Association (0- to 5-percent slopes) and Vessilla-Menefee-Orlie Association (0- to 33-percent slopes).

Orlie-Sparham Association (0- to 5-percent slopes)

Orlie-Sparham Association (o- to 5-percent slopes) soils are found throughout the proposed Lybrook P12 project area with the exception of the northern terminus of the proposed access road and well-connect pipeline corridor.

This association is composed of 45 percent Orlie and similar soils and 35 percent Sparham and similar soils. The parent material of this soil association primarily consists of stream alluvium and shale eolian deposits derived from sandstone and shale. This soil is considered a well-drained soil, with the depth to water table and restrictive layer being more than 80 inches. Available water capacity for the Orlie-Sparham association is high (approximately 9.5 to 10.1 inches). This soil type has a low susceptibility to water erosion and high susceptibility to wind erosion. This soil type is typically found along alluvial fans, hill, valley side, mesa, floodplains, and cuesta landscapes and gravelly loam and clay ecological sites (NRCS 2008).

Vessilla-Menefee-Orlie Association (0- to 33-percent slopes)

Vessilla-Menefee-Orlie Association (0- to 33-percent slopes) soils are near the northern terminus of the proposed access road and well-connect pipeline corridor.

This association is composed of 35 percent Vessilla and similar soils, 30 percent Menefee and similar soils, and 25 percent Orlie and similar soils. The parent material of this soil association primarily consists of eolian, colluvium, deposits derived from sandstone and shale. This soil is considered a well-drained soil, with the depth to water table being more than 80 inches and depth to restrictive layer ranging from 4 to more than 80 inches. Available water capacity for this soil association is very low to high (approximately 1.8 to 11.9 inches). This soil type has a high susceptibility to water erosion and very high susceptibility to wind erosion. This soil type is typically found along mesa, hill, break, ridge, mountainside, and cuesta landscapes and gravelly loam, piñon pine (*Pinus edulis*)-skunkbush sumac (*Rhus trilobata*)-blue grama (*Bouteloua gracilis*), and piñon pine-oneseed juniper (*Juniperus monosperma*)-Gambel oak (*Quercus gambelii*)-blue grama ecological sites (NRCS 2008).

3.3.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. No new surface disturbance would occur, and soil resources within the proposed project area would not be impacted.

3.3.3. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

New surface disturbance associated with the proposed project would be approximately 9.4 acres. Of this, 2.0 acres would remain bare, compacted surface for the life of the proposed project. The remaining 7.4 acres would be reclaimed during interim reclamation.

Construction activities would result in the mixing, displacement, and compaction of soils within the proposed project area. Soils within the proposed project area are classified as having a high to very high susceptibility to wind erosion and a low to high susceptibility to water erosion (NRCS 2008). The removal of vegetation within the proposed project area could result in increased soil erosion within and downstream of the proposed project area. The degree of erosion would be dependent upon precipitation and wind. Following construction, the compaction of soils, reclamation of portions of the proposed project area, and implementation of erosion-control measures would limit soil impacts due to erosion. The

operator will be required to meet all the FFO Bare Soil Reclamation Procedure (2/1/2013) requirements and standards. The operator must submit a plan that addresses the construction, reclamation, reseeding and monitoring of the proposed projects. Proper reclamation and monitoring will reduce the opportunity for soil erosion.

Cumulative Impacts

Past, present, and future developments are expected to result in a range of short- and long-term impacts to soils, including disturbance, temporary or permanent increases in erosion prior to reclamation, and reduction of soil loss to erosion where reclamation and re-vegetation occurs. Given that about 9.4 acres of soil would be disturbed by the proposed action and the large extent that these soil types occur in the San Juan Basin, any impact from the proposed action is not expected to contribute appreciably to cumulative impacts to soils when added to past, present, and reasonably foreseeable actions.

3.4. Water Resources

3.4.1. Affected Environment

Under the Clean Water Act, the USACE has jurisdiction over “waters of the U.S.” These jurisdictional waters include those that have a “significant nexus” to traditional navigable waters. The BLM/FFO and USACE Durango Regulatory Division have determined that jurisdictional waters may include USGS watercourses.

One erosional and ephemeral drainage classified as a USGS watercourse is located within the proposed Lybrook P12 project area north of the proposed well pad. As discussed in Section 1.5.1 (Clean Water Act), the BLM-FFO and USACE - Durango Regulatory Office have determined that USACE-jurisdictional waters may include USGS watercourses. The proposed well-connect pipeline would be trenched through this watercourse, and fill and topsoil would be placed over the pipeline to match the original terrain; the permanent elevation of the watercourse would not be changed. A culvert would be placed beneath the proposed access road where this watercourse is being crossed; thereby, the natural flow of the watercourse would not be altered. An existing stock pond associated with the aforementioned USGS watercourse is located approximately 60 feet north of the northeastern corner of the proposed Lybrook P12 well pad construction zone. Impacts to surface water resources would be expected to be negligible with the aforementioned mitigations.

3.4.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. Existing surface hydrology would remain and no USGS watercourses or erosional drainages would be impacted.

3.4.3. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The proposed Lybrook P12-2206 access road and well-connect pipeline corridor cross a USGS watercourse. The proposed road meets the requirements to be covered under the USACE Nationwide Permit No. 14 (Linear Transportation Projects) and the proposed well-connect pipeline corridor meets the requirements to be covered under Nationwide Permit No. 12 (Utility Line Activities). The existing stock pond would be maintained (cleared and excavated) during the proposed construction phase of the project. The proposed stock pond maintenance activities would meet the requirement to be covered under USACE Nationwide Permit No. 3 (Maintenance Projects).

Cumulative Impacts

Cumulative effects to water resources from the proposed action would be maximized shortly after construction begins and would decrease over time as reclamation efforts progress.

Past, present, and future developments are expected to result in a range of short- and long-term impacts to water resources, including disturbance, temporary or permanent increases in erosion and sedimentation, prior to reclamation.The proposed action would cumulatively contribute approximately 2.0 acres of long-term disturbance in the watershed. Cumulative impacts to surface waters would be related to short-term sedimentation or flow changes. Surface-disturbing activities other than the proposed action that may cause accelerated erosion include—but are not limited to—construction of roads, other facilities, and installation of trenches for utilities; road maintenance, such as grading or ditch cleaning; public recreational activities; vegetation manipulation and management activities; prescribed and natural fires; and livestock grazing.

3.5. Upland Vegetation

3.5.1. Affected Environment

The proposed project area is located within the Arizona/New Mexico Plateau ecological region. This ecological region occurs primarily in Arizona, Colorado, and New Mexico; a small portion of the region is located within Nevada. This region encompasses approximately 45,870,500 acres (185,632 square kilometers), and the elevation ranges from 2165 to 11,949 feet (660 to 3,642 meters) AMSL. The ecological region's landscapes include low mountains, hills, mesas, foothills, irregular plains, alkaline basins, wetlands, and some sand dunes. The Arizona/New Mexico Plateau ecological region is a large transitional area located 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 within this region include shrublands of big sagebrush (*Artemisia tridentata*), rabbitbrush (*Ericameria* spp.), winterfat (*Krascheninnikovia lanata*), shadscale saltbush (*Atriplex confertifolia*), and greasewood (*Sarcobatus vermiculatus*); and grasslands of blue grama, western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), and needle-and-thread grass (*Hesperostipa comata*). Higher elevations within the Arizona/New Mexico Plateau ecological region may support piñon pine and juniper (*Juniperus* spp.) woodlands. This ecological region includes the urban areas of Santa Fe and Albuquerque, New Mexico. Important land uses within the region include irrigated farming, recreation, rangeland, wildlife habitat, and some natural gas production (Griffith et al. 2006).

The general region surrounding the proposed project area is characterized by valleys vegetated with sagebrush shrublands and rolling hills vegetated with open to dense piñon-juniper woodlands. Small cliffs vegetated with piñon-juniper woodlands and scattered ponderosa pine trees are located southwest of the proposed project area.

The proposed project area is characterized by sagebrush shrublands with open piñon pine and oneseed junipers trees. Approximately 20 to 30 piñon pine and oneseed juniper trees are scattered within this vegetation community; approximately 50 percent are mature, 45 percent are juvenile, and 5 percent are standing dead. Ground cover within this vegetation community is approximately 50 to 80 percent. Dominant species are big sagebrush, blue grama, and James' galleta (*Pleuraphis galleta*). Additional species identified include oneseed juniper, piñon pine, banana yucca (*Yucca baccata*), broom snakeweed (*Gutierrezia sarothrae*), claretcup cactus (*Echinocereus triglochidiatus*), fourwing saltbush (*Atriplex canescens*), pricklypear (*Opuntia* spp.), spinystar (*Coryphantha vivipara*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), biscuitroot (*Cymopterus* sp.), lambsquarters (*Chenopodium* sp.), Indian ricegrass (*Achnatherum hymenoides*), purple threeawn (*Aristida purpurea*), sand dropseed (*Sporobolus cryptandrus*), squirreltail (*Elymus elymoides*), and Russian thistle (*Salsola tragus*). The noxious weed found within the proposed project area includes cheatgrass (*Bromus tectorum*).

3.5.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. No new surface disturbance would occur, and existing vegetation within the proposed project area would not be impacted.

3.5.3. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

During the construction phase of the proposed project, all vegetation within the 9.4 acres associated with the new surface disturbance for the proposed project area would be cleared. During interim reclamation, approximately 7.4 acres of the proposed project area would be reclaimed. Approximately 2.0 acres would remain as compacted, barren surface for the life of the proposed wells. During final reclamation, Encana would reclaim all portions of the proposed project area that were not reclaimed during interim reclamation.

During interim and final reclamation, the BLM Sagebrush-Grass seed list would be utilized; the species included in this mixture are listed in the reclamation plan (Appendix E). Re-established vegetation would consist of native grass, forb, and shrub species included in the seed mixture, as well as native species that are not deliberately planted. It is also possible that invasive, non-native species could become established within the proposed project area, as such species could be transported by project equipment and tend to thrive in disturbed areas. Following the reclamation process, the resulting vegetation community could differ from the native plant community surrounding the proposed project area. Within reclaimed areas, it is not expected that the vegetation community 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 proposed well pad and access road, and during wind events could reduce photosynthesis and productivity of the surrounding vegetation (Thompson et al. 1984; Hirano et al. 1995), increase water loss in plants near the proposed project area (Eveling and Bataille 1984), and result in injury to leaves of surrounding vegetation.

Cumulative Impacts

The spatial analysis area includes the proposed project area and immediately adjacent lands.

Existing disturbances within the proposed Lybrook P12 spatial analysis area include the following:

- The proposed well-connect pipeline corridor terminates at the existing Lybrook Trunk No. 1 Phase 1 pipeline
- A portion of the proposed well-connect pipeline corridor and access road follow a reclaimed road and cross an existing road
- The proposed access road would begin at an existing road
- A large stock pond is located north of the proposed well pad
- Active wildlife and livestock grazing occurs in the spatial analysis area; the spatial analysis area is within the Venado grazing allotment (Allotment No. 5112) and the Venado allotment is permitted for year-round grazing by 79 cattle

Indirectly, fugitive dust or deposition associated with existing and proposed roads and well pads in the immediate area could impact the vegetation within the spatial analysis area, and could continue to do so throughout the life of the proposed project. The proposed project would contribute to direct vegetation disturbance and fugitive dust and/or deposition within the spatial analysis area.

3.6. Wildlife

3.6.1. Affected Environment

General Wildlife

The vegetation community found within the proposed project area provides 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 2003a, 2-24). The significance of the general region to the overall Lybrook/Upper Largo ecosystem is that it represents a metapopulation with respect to mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*).

No prairie dog colonies have been recorded by the BLM-FFO within or adjacent to the proposed project area (BLM 2012b); the closest recorded colony is approximately 14 miles south of the proposed project area. No sign of prairie dogs was observed during the biological surveys.

The following terrestrial wildlife species and/or sign were observed/heard during the biological surveys of the proposed Lybrook P12 project:

- Desert cottontail (*Sylvilagus audubonii*)
- Rodent (Species not Identified) burrows

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 in 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. These species with the potential to occur within the proposed project areas and a brief description of their habitat are provided in the table below.

Table 11. Migratory Birds with Potential to Occur in the Proposed Project Area

Species Name	Habitat Associations	Potential to Occur within Proposed Project Area
Bendire's thrasher (*Toxostoma bendirei*)	On the Colorado Plateau, inhabits open sagebrush with scattered junipers; sparse or degraded understory, lower elevations. Avoids riparian areas and arroyos with dense shrub cover	POSSIBLE: Sagebrush shrublands with scattered piñon pine and oneseed juniper trees within the proposed project area provide potential habitat for this species.
Black-throated sparrow (*Amphispiza bilineata*)	Xeric habitats dominated by open shrubs with areas of bare ground.	UNLIKELY: Vegetation communities within and adjacent to the proposed project area would not likely provide suitable habitat for this species.

Brewer's sparrow (*Spizella breweri*)	Closely associated with sagebrush, preferring dense stands broken up with grassy areas.	POSSIBLE: Sagebrush shrublands with scattered piñon pine and oneseed juniper trees within the proposed project area provide potential habitat for this species.
Gray vireo (*Vireo vicinior*)	In northern NM, stands of piñon pine and Utah juniper 5800 - 7200 ft., open with a shrub component and mostly bare ground; antelope bitterbrush, mountain mahogany, Utah serviceberry and big sagebrush often present. Broad, flat or gently sloped canyons, in areas with rock outcroppings, or near ridge-tops.	UNLIKELY: Vegetation communities within and adjacent to the proposed project area would not likely provide suitable habitat for this species. No rock outcroppings adjacent to proposed project area.
Loggerhead shrike (*Lanius ludovicianus*)	Open country interspersed with improved pastures, grasslands, and hayfields. Nests in sagebrush areas, desert scrub, and woodland edges.	POSSIBLE: Sagebrush shrublands with scattered piñon pine and oneseed juniper trees within the proposed project area provide potential habitat for this species.
Mountain bluebird (*Sialia currucoides*)	Open piñon-juniper woodlands, mountain meadows, and sagebrush shrublands; requires larger trees and snags for cavity nesting.	KNOWN: Sagebrush shrublands with scattered piñon pine and oneseed juniper trees within the proposed project area provide habitat for this species.
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.	POSSIBLE: Vegetation communities within and adjacent to the proposed project area could provide suitable habitat for this species.
Sage thrasher (*Oreoscoptes montanus*)	Shrub-steppe dominated by big sagebrush.	POSSIBLE: Sagebrush shrublands with scattered piñon pine and oneseed juniper trees within the proposed project area provide potential habitat for this species.
Scaled quail (*Callipepla squamata*)	Brushy arroyos, cactus flats, sagebrush or mesquite plains, desert grasslands, Plains grasslands, and agricultural areas. Good breeding habitat has a diverse grass composition, with varied forbs and scattered shrubs.	POSSIBLE: Sagebrush shrublands with scattered piñon pine and oneseed juniper trees within the proposed project area and desert scrub adjacent to the proposed project area could provide potential habitat for this species.

Based on habitat and range, the potential exists for numerous migratory birds to occur within the proposed project area. The following birds were observed and/or heard during the biological surveys of the proposed project area:

- American crow (*Corvus brachyrhynchos*)
- Ash-throated flycatcher (*Myiarchus cinerascens*)
- Horned lark (*Eremophila alpestris*)
- Lark sparrow (*Chondestes grammacus*)
- Mountain bluebird
- Northern flicker (*Colaptes auratus*)
- Pinyon jay (*Gymnorhinus cyanocephalus*)

3.6.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. No new surface disturbance would occur, and wildlife resources (including migratory birds) within the proposed project area would not be impacted.

3.6.3. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

There is available, similar habitat in the region surrounding the proposed project area that birds and wildlife could utilize. However, the clearing of vegetation and the transformation of the proposed project area to a reseed community would remove potential habitat and result in habitat fragmentation for numerous wildlife species, including priority bird species.

During the construction phase of the proposed project, all vegetation within the 9.4 acres associated with the proposed project area would be cleared. Approximately 2.0 acres would remain barren of vegetation for the long term. Reclaimed portions of the proposed project area would be converted to a reseed community following interim reclamation and final reclamation. The impacts to the sagebrush shrubland and open piñon pine and oneseed juniper vegetation community is described in detail in Section 3.4 (Upland Vegetation). If interim and final reclamation are successful, a sagebrush shrubland community with open piñon pine and oneseed junipers trees would become re-established within the proposed project area. However, as discussed in Section 3.4, 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).

Habitat loss and fragmentation likely reduce the carrying capacity for birds and wildlife, although the exact level of reduction cannot be quantified (BLM 2003a, 4-26 – 4-27). Fragmentation would result from construction within areas that are not adjacent to existing surface disturbance. There would be approximately 2,799 linear feet (0.5 mile) of habitat fragmentation resulting from the proposed access road, well pad, and well-connect pipeline corridor; this fragmentation would exist until final reclamation is deemed successful. Initial habitat fragmentation would result from the following:

- Proposed Lybrook P12 project features:
    - Access road: 1,953 feet (all of this access road would parallel the proposed well-connect pipeline corridor)
    - Well pad (including construction zone): 590 feet (along longest side)
    - Well-connect pipeline corridor: 2,209 feet

For the long term, the proposed access road and the working area of the proposed well pad (250 feet along longest sides) would result in 2,203 linear feet (0.4 mile) of long-term habitat fragmentation.

For the long term, occasional human and vehicle presence within the vicinity of the proposed project area would increase above present levels. Additional well equipment could also cause increased noise levels in the vicinity. Audial and visual disturbances associated with the proposed project could cause indirect habitat loss by deterring wildlife from using available habitat adjacent to the proposed project area.

General Wildlife

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

During the construction phase of the proposed well-connect pipeline corridor, terrestrial wildlife could fall into the open pipeline trench and be injured, stressed, or killed. The presence of an open trench could also disrupt normal wildlife movements to and from water and/or food sources. Wildlife could have to skirt

the open-trench portions of the proposed well-connect pipeline corridor to access water and/or food. This disruption could stress wildlife and result in the loss of valuable energy resources. As discussed in Section 2.2.2 (Description of Proposed Project – Protection of Flora and Fauna, Including SSS and Livestock), design features and BMPs would be implemented during the construction phase of the proposed well-connect pipeline corridor to assist in the prevention of injury, stress, or death of wildlife.

Migratory Birds

Due to the mobility of adult birds, they would be unlikely to be directly harmed by the proposed project. If the vegetation-clearing phase of construction for the proposed project is scheduled to occur during migratory bird breeding season, a pre-construction nest survey would take place, as discussed in Section 2.2.2 (Description of Proposed Project – Protection of Flora and Fauna, Including SSS and Livestock). Therefore, it is unlikely that any nests, eggs, or young birds would be directly harmed by the proposed project. Birds nesting outside of but near the proposed project area could abandon existing nests as a result of visual and audial disturbances.

It is difficult to predict the effects of the proposed project on migratory birds. The increased activity, noise, and disturbed vegetation associated with the proposed project 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.

Cumulative Impacts

The spatial analysis area for wildlife includes the proposed project area and an approximately two-mile radius around the proposed project area. Within the spatial analysis area, there is existing and proposed disturbance, and the region has been fragmented. Existing and reasonably foreseeable future disturbance within the spatial analysis area includes the following:

- 7 new or active oil and/or gas wells and associated well pads
- 3 inactive oil and/or gas wells and associated well pads (some reclaimed)
- 8 proposed oil and/or gas wells including well pads and associated roads and utility corridors
- Approximately 38 miles of existing roads
- Numerous existing and proposed utility ROWs
- Active wildlife and livestock grazing occurs in the spatial analysis area; the spatial analysis area is within the Venado grazing allotment (Allotment No. 5112) and the Venado allotment is permitted for year-round grazing by 79 cattle

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

3.7. Special Status Species

3.7.1. 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, and 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, six BLM SSS have the potential to occur within the proposed project area. These species, their habitat descriptions, and their potential to occur within the proposed project area are provided in Table 12.

Table 12. BLM Special Status Species with Potential to Occur within Proposed Project Area

Species	Status	Documented Occurrence Within BLM-FFO Region	Habitat	Potential to Occur in Proposed Project Area
BIRDS				
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: The proposed project area provides appropriate nesting and foraging habitat for this species.
Ferruginous hawk (*Buteo regalis*)	Sensitive & 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 is available within the proposed project area. No nesting habitat is available in the vicinity (nearest recorded nest is 29 miles west of the proposed project area).

Species	Status	Documented Occurrence Within BLM-FFO Region	Habitat	Potential to Occur in Proposed Project Area
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 is available within the proposed project area. Nesting habitat is available in the vicinity, though not immediately within or adjacent to the proposed project area (nearest recorded nest 8 miles southeast of the proposed project area).
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 chaparral (NMPIF 2007).	KNOWN: There are piñon-juniper woodlands within the proposed project area. Pinyon jays were identified within the proposed project area during the biological surveys.
Mammals				
Spotted bat (*Euderma maculatum*)	Sensitive (State Threatened)	Permanent resident (NatureServe 2012).	Various habitats, including deserts, open ponderosa pine (*Pinus ponderosa*) forests, piñon-juniper woodland, canyon bottoms, open pasture, and hayfields. Roosts in caves and in cracks and crevices or canyons or cliffs (NatureServe 2012).	POSSIBLE: There are piñon-juniper woodlands within the proposed project area. There are cliffs in the general vicinity, though none within or adjacent to the proposed project area. The proposed project area could be used for foraging.
Townsend's big-eared bat (*Corynorhinus townsendii*)	Sensitive	Known to occur within BLM-FFO (BLM 2011b).	Desert scrub, desert mountains, oak-woodlands, piñon-juniper woodlands, and coniferous forests. Roost mostly in caves, mines, or abandoned buildings (BLM 2011b; Gruver and Keinath 2003).	POSSIBLE: There are piñon-juniper woodlands within the proposed project area. There are no known caves, mines, or abandoned buildings in the vicinity. The proposed project area could be used for foraging.

3.7.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. No new surface disturbance would occur, and SSS within the proposed project area would not be impacted.

3.7.3. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Bendire's Thrasher and Pinyon Jay

Impacts to Bendire's thrashers and pinyon jays would be similar to those described for migratory birds (Section 3.5.2 [Wildlife– Impacts from the Proposed Action – Migratory Birds]).

Ferruginous Hawk and Golden Eagle

Due to the mobility of adult raptors and the lack of appropriate nesting sites for these raptors in the vicinity of the proposed project area, it is unlikely that these raptors would be directly harmed by activities associated with the proposed project.

The clearing of vegetation would result in the removal of foraging habitat and the creation of habitat fragmentation for raptors. In addition, audial and visual disturbances associated with the proposed project could cause indirect habitat loss. Habitat loss and fragmentation are described in detail in Section 3.5.2 (Wildlife – Impacts from the Proposed Action - Direct and Indirect Impacts).

Spotted Bat and Townsend's Big-Eared Bat

Proposed project activities in the vicinity of nearby cliff walls could potentially disturb roosting bats; however, because these species are highly mobile, it is unlikely that proposed project activities would directly harm individual bats.

Audial and visual disturbances associated with proposed project activities (such as construction, drilling, and reclamation) could deter these species from foraging in the immediate proposed project area for the short term. Bats could continue to forage within the proposed project area following the removal of the current vegetation community; however, it is unlikely that these species would prefer disturbed habitat to undisturbed habitat in the vicinity of the proposed project.

Cumulative Impacts

The spatial analysis area for SSS includes the proposed project area and an approximately two-mile radius around the proposed project area. Within the spatial analysis area, there is existing disturbance and reasonably foreseeable future disturbance anticipated. This disturbance is described in detail in Section 3.5.2 (Wildlife – Impacts from the Proposed Action – Cumulative Impacts). Habitat disturbance in the area is primarily the result of oil and gas development (including well pads, access roads, and well-connect pipeline corridors).

Cumulative impacts to these SSS would be similar to those described for wildlife (Section 3.5.2 [Wildlife - Impacts from the Proposed Action – Cumulative Impacts]).

3.8. Cultural Resources

3.8.1. Affected Environment

The proposed project area is located within the archaeologically rich San Juan Basin of northwestern New Mexico. In general, the history of the San Juan Basin can be divided into five major periods: PaleoIndian (circa [ca.] 10000 B.C. to 5500 B.C.); Archaic (ca. 5500 B.C. to A.D. 400); Basketmaker II-III and Pueblo I-IV (aka Anasazi; A.D. 1-1540); and historic (A.D. 1540 to present), which includes Native

American as well as later Hispanic and Euro-American settlers. Detailed descriptions of these various periods are provided in the BLM-FFO PRMP/FEIS (BLM 2003a, pp. 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 Area of Potential Effect (APE) for the originally proposed action and revised access and well-tie pipeline were archaeologically surveyed by LAC (Report 2012-1zzz [2013] and 2012-1zzz#2 [2014]; BLM 2013 [III]056F and 2012(IV)042.2F) at a BLM Class III (100-percent) level. The archaeological reports were prepared and submitted to the BLM in accordance with the *Procedures for Performing Cultural Resources Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities* (BLM 2005). Survey details for projects in the original proposed action, as well as the currently proposed action, are described below. The Class III inventory resulted in the identification and update of one previously recorded cultural site within the APE of the revised access/pipeline. This cultural site is a location of lithic scatter officially needing data before a determination of National Register eligibility can be made.

No TCPs are known to exist in the APE.

3.8.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. No new surface disturbance would occur, and cultural resources within the proposed project area would not be impacted.

3.8.3. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Cultural resources tend to degrade over time from natural forces; however, many survive for hundreds or thousands of years. Any land-disturbing activity can disturb, damage, or uncover cultural resources. Direct impacts normally include alterations to the physical integrity of a historic property. If a historic property is significant for other than its information potential, direct impacts may also include the introduction of audible, atmospheric, or visual elements that are out of character for the property. A potential indirect impact from the proposed action, particularly in undeveloped areas is the increase in human activity or access to the area with an increased potential of unauthorized damage to historic properties. Historic properties (sites eligible for the NRHP) will 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 stipulation 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 pursuant to the AIRFA (42 USC 1996), EO 13007, or the NAGPRA (25 USC 3001). The proposed action would have no direct or indirect impact on historic properties (no historic properties affected).

Cumulative Impacts

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

3.9. Visual Resources

3.9.1. Affected Environment

The BLM classifies visual resources through a Visual Resource Inventory (VRI). The VRI has three components: scenic quality, sensitivity, and distance zone.

Scenic quality is a measure of the visual appeal of a tract of land. In the VRI process, BLM-managed lands are given an A, B, or C rating based on the apparent scenic quality. Scenic quality is determined by using seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modification. Areas with the most visual appeal are rated A, while areas with the least visual appeal are rated C. The proposed project area is within an area rated “C” for scenic quality.

Sensitivity is a measure of the public concern for scenic quality. During the sensitivity rating, public lands are assigned high, medium, or low sensitivity by analyzing six indicators of public concern: type of user, amount of use, public interest, adjacent land uses, special areas, and other factors. The proposed project area is within an area rated “medium” for sensitivity.

The distance zone analysis is conducted to determine the relative visibility from travel points or observation points. The distance zone for this area is foreground, meaning the area can be seen from travel routes of observation points within a distance of 3 to 5 miles. This indicates activities and development may be able to be viewed in detail.

These components resulted in the proposed project area being assigned a VRI “IV”.

Because of the high visibility associated with portions of the proposed project area, a Visual Contrast Rating (VCR) Worksheet was completed for the proposed project (Appendix D) on March 24, 2015. Two observers surveyed the region from one Key Observation Points (KOP) (see Figure A.3, Appendix A).

The KOP is located along an existing oil and gas service road, approximately 0.3 mile west of the point at which the proposed access road begins on the existing road and 0.8 mile west-northwest of a high mesa with steep cliffs east of Chaco Culture National History Park. From the KOP, the proposed project area is visible. Also visible from the KOP were rolling lowlands within the valley, the steep mesa, a fence, and a sign indicating the edge of the Jicarilla Apache Reservation to the east. Visible vegetation consists of smooth to course, green patches of shrubs, with some treated sagebrush (see KOP photographs in Appendix C).

Visual resources are managed by assigning a Visual Resource Management (VRM) Class. The objective for each VRM Class describes how that area should be managed. The proposed project area is within a VRM Class IV. The objective of the class is to provide for activities that require major modification of the landscape. The level of change to the landscape can be high, and management activities may dominate the view and be the major focus of attention (BLM 2003a, 2-8).

SQRU 030: Sisnathyel

In Areas Not Overlapping Sensitivity Rating Unit 044-Chaco Canyon

Scenic Quality: C

The area contains a band of badland landscape in the middle of a large, open complex of rolling hills and dry drainages. The low buttes and mesas of the badlands add diagonal lines to the otherwise horizontal landscape. Scattered clusters of pinon/juniper add greens and grays to the browns, reds, whites, and yellows of the soils.

Sensitivity: Medium

VRI Class: IV

3.9.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. No new surface disturbance would occur, and existing visual resources within the proposed project area would not be impacted.

3.9.3. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Construction, maintenance, and final abandonment activities would result in short-term impacts to visual resources. During these phases of the proposed project, a small increase in dust, traffic, and human presence would be apparent within the proposed project area.

The proposed project would visually impact the region until the proposed wells are no longer in use. The proposed project includes the construction, use and final reclamation of one proposed well pad (including construction zone), proposed access road (including one pullout area), and one well-connect pipeline corrdior. Oil and natural gas production facilities will remain on the well pad for the duration of the proposed project. These facilities would result in an alteration in the texture of the natural environment and would produce a break in the natural, horizontal landscape plane. Where vegetation would be removed, a break in vegetation would also be apparent. Portions of the project facilities would be visible to individuals form the existing oil and gas service road (see VCR worksheets, Appendix D).

Cumulative Impacts

The proposed project is congruent with viewer expectation in the area, as the proposed project would be located in an area known for oil and gas production and associated facilities. The proposed access road would mostly parallel an existing two-track. Activities may attract attention but would not dominate the view of the casual observer. Criteria for VRM Class IV would be met.

3.10. Travel and Transportation

3.10.1. Affected Environment

The proposed Lybrook P12 well pad would require the construction of 1,953 feet (1.4 acres) of new access road. A detailed description of the proposed access road is provided in Section 2.1.3. (Proposed Surface Disturbance – Access Road).

3.10.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project including the new access road would not be constructed and the two associated oil and natural gas wells would not be drilled. No new surface disturbance would occur, and existing travel and transportation within the general region would not be impacted.

3.10.3. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Roads would be maintained in the same or better condition as existed prior to the commencement of operations and maintenance would continue until final abandonment and reclamation of the well locations. Encana would inspect and maintain the proposed road in accordance with the Road Maintenance Plan attached to the Surface Use Plan of Operations.

Dust emissions would be controlled on the proposed access road and other locations during construction, drilling, and completions operations with application of dust suppressants (e.g. water and/or magnesium chloride). Dust control would be implemented when dust plumes become larger than normal road use conditions or when directed by a BLM Authorized Officer.

The proposed access road would be constructed with one pullout area (stationing 7+47 to 8+97) for sight mitigation safety and to allow traffic to pass. Signs would be placed along the proposed access road at stations 0+00 and 19+53 to direct drivers to observe oncoming traffic, stay on the driving surface, and use the pullout area to pass.

A detailed Description of the proposed pullout area is provided in Section 2.2.3. (Proposed Surface Disturbance – Pullout Area).

Cumulative Impacts

The existing road would remain open for travel during construction of the proposed project. Therefore, transportation in this area would not be hindered by the proposed access road and would cause minimal cumulative impacts to travel and transportation in the area.

3.11. Livestock Grazing

3.11.1. Affected Environment

The entirety of the proposed project area is located within the Venado Grazing Allotment (Allotment No. 5112). The vegetation communities within this allotment are primarily sagebrush shrublands, piñon-juniper woodlands, and scattered badlands. The allotment is permitted for grazing 79 head of cattle, annually. The term grazing authorization permits the utilization of 806 active Animal Unit Months (AUMs) of forage for cattle. An AUM is the amount of forage needed to sustain a cow (1,000-pound) or cow/calf pair for one month. The allotment is 13,634 acres and consists of 85-percent BLM-authorized AUMs. The average rangeland carrying capacity for the allotment is 16.9 acres per AUM.

The analysis area contains some range improvements. There is an existing, stock pond that is located adjacent to the northeastern corner of the proposed Lybrook P12 well pad construction zone. The eastern boundary of the grazing allotment is fenced and abuts the Jicarilla Apache Nation.

3.11.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. No new surface disturbance would occur, and existing livestock grazing within the proposed project area would not be impacted.

3.11.3. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The proposed project would result in the surface disturbance of 9.4 acres. The estimated short-term impact to range carrying capacity would be a loss of 0.6 AUM (assuming an average rangeland carrying capacity of 16.9 acres per AUM within a disturbance 9.4-acre area). After successful interim reclamation, the long-term-loss would be 0.1 AUM (assuming the same average rangeland carrying capacity as above, with a long-term disturbance area of 2.0 acres within the Venado Allotment).

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

Direct impacts to livestock would occur if holes or ditches are not excluded properly. Any type of hole or ditch is potentially a hazard to livestock while grazing. Cow or calf injuries could occur if these animals fall into or try to get out of a ditch-type cavity. Cow or calf leg injuries could also occur if a small hole is left uncovered. Livestock could step into the hole and break a leg.

Impacts to livestock could occur if containment of livestock is compromised (e.g., if fences are cut and not properly and promptly repaired). This could result in injury to livestock or individuals in the event of a vehicular accident. Indirect impacts could include time spent by the permittee to locate livestock or deal with potential trespass issues regarding the respective livestock owner if the livestock cross allotment boundaries.

An existing stock pond, located within the Venado Allotment adjacent to the northeastern corner of the proposed Lybrook P12 well pad construction zone would be maintained (cleared and excavated) during the construction phase of the proposed Lybrook P12 project. As a result, the proposed Lybrook P12 project could benefit livestock for the long term by providing a maintained silt trap that would better store water during precipitation events.

Cumulative Impacts

The spatial analysis area for livestock grazing is the Venado Allotment. Within this allotment, the following existing and reasonably foreseeable disturbances are present:

- 35 new or active oil and/or gas wells and associated well pads
- 15 inactive oil and/or gas wells and associated well pads (some reclaimed)
- At least 28 proposed oil and/or gas wells including well pads and associated roads and utility corridors
- Approximately 39 miles of existing roads (including 2 miles of U.S. Highway 550)
- Numerous existing and proposed utility ROWs

The proposed project would contribute to cumulative disturbance within this allotment.

3.12. Environmental Justice

3.12.1. Affected Environment

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, requires that Federal agencies identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations.

Environmental justice refers to the fair treatment and meaningful involvement of people of all races, cultures, and incomes with respect to the development, implementation, and enforcement of environmental laws, regulations, programs, and policies. It focuses on environmental hazards and human health to avoid disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Guidance on environmental justice terminology developed by the President’s Council on Environmental Quality (CEQ 1997) is discussed below.

- Low-income population. A low-income population is determined based on annual statistical poverty thresholds developed by the US Census Bureau. In 2012, poverty level is based on total income of $11,720 for an individual and $23,283 for a family of four (US Census Bureau 2012a). A low-income community may include either a group of individuals living in geographic proximity to one another or dispersed individuals, such as migrant workers or Native Americans.
- Minority. Minorities are individuals who are members of the following population groups: American Indian, Alaskan Native, Asian, Pacific Islander, Black, or Hispanic.

- Minority population area. A minority population area is so defined if either the aggregate population of all minority groups combined exceeds 50 percent of the total population in the area or if the percentage of the population in the area comprising all minority groups is meaningfully greater than the minority population percentage in the broader region. Like a low-income population, a minority population may include either individuals living in geographic proximity to one another or dispersed individuals.

- Comparison population. For the purpose of identifying a minority population or a low-income population concentration, the comparison population used in this study is the state of New Mexico as a whole

Low-income Populations

Income and poverty data estimates for study area counties from the US Census Small Area Poverty Estimates model indicate that the percent of the population living below the poverty level in the socioeconomic study area as a whole is slightly above that of the state (21.3 percent and 20.6 percent), but it is much higher than the national average of 12.1 percent (Table 13). Poverty levels ranged from 37.7 percent in McKinley County to 13.7 percent in San Juan County. Only that of Sandoval County was below the state average.

Table 13. Study Area County Population in Poverty (2002-2012)

	McKinley County	Rio Arriba County	Sandoval County	San Juan County	Study Area Total	New Mexico	United States
Percent of Population in Poverty 2002	21,766	7,165	19,934	22,152	71,017	421,123	34,569,951
	30.2%	17.7%	11.1%	18.2%	21.3%	20.6%	12.1%
Percent of Population in Poverty 2012	27,296	8,806	18,502	25,802	80,406	327,444	48,760,123
	37.7%	22.0%	13.7%	20.3%	21.5%	17.7%	15.9%
Median Household Income 2002	$25,197	$30,557	$45,213	$34,329	N/A	$34,827	$45,409
Median Household Income 2012	$29,821	$36,900	$57,376	$45,901	N/ A	$42,828	$51,371
Classified as Low Income Population in 2012 based on CEQ guidelines?	No	No	No	No	No	NA	NA
Source: US Census Bureau 2013							

Similarly, estimates from 2012 indicate that Sandoval and San Juan Counties had household median incomes ($57,376 and $45,901) that were above the state level of $42,828. McKinley County ($29,821) and Rio Arriba County ($36,900) were below that of the state in 2012 (Table 13). While no area communities meet the CEQ definition of a low-income population area (50 percent or higher), the highest poverty rates were seen in Bloomfield (29 percent), Espanola (26.3 percent), and Bernalillo (24.1 percent; Table 14).

Table 14. Study Area Key Community Race/Ethnicity and Poverty Data

Community	% Population Racial or Ethnic Minority	Classified as Minority Population based on CEQ?	% of Individuals Below Poverty	Classified as Low-income Population based on CEQ?
Aztec	36.4%	No	14.4%	No
Bernalillo	78.8%	Yes	24.1%	No
Bloomfield	55.8%	Yes	29.0%	No
Espanola	91.6%	Yes	26.3%	No
Farmington	48.8%	No	15.5%	No
Gallup	76.9%	Yes	20.9%	No
Rio Rancho	46.7%	No	9.8%	No

Source: US Census Bureau 2012b
Note: American Community Survey estimates are based on data collected over a 5-year time period. The estimates represent the average characteristics of populations between January 2008 and December 2012 and do not represent a single point in time.

Census Tracts are geographic regions within the United States that are defined by the US Census Bureau in order to track changes in a population over time. Census Tracts are based on population sizes and not geographic areas. The average population of a Census Tracts is about 4,000 people, so rural areas that are sparsely populated may have very large Census Tracts while densely populated urban areas may have very small Census Tracts.

When broken down by Census Tract, 3 out of 87 tracts in the socioeconomic study area have greater than 50 percent of individuals living below the poverty line: Census Track 9440 in eastern McKinley County had an individual poverty rate of 54.6 percent; Census Tract 9405 in southwestern McKinley County had an individual poverty rate of 59.4 percent; and Census Tract 9409 in northwestern Sandoval County had an individual poverty rate of 51.9 percent (US Census Bureau 2012b). These 3 Census Tracts are all relatively large, indicating a sparsely populated, rural area.

Minority Populations

Based on 2008-2012 data, minorities made up 59.5 percent of the population in New Mexico, compared to 36.3 percent in the United States as a whole (Table 15). The proportion of minorities in the socioeconomic study area (65.3 percent) substantially exceeded the United States and is slightly higher than the state average. At the county level, the population ranged from 89.7 percent minority in McKinley County to 52.8 percent in Sandoval County. Within relevant tribal nations, Native Americans represented the vast majority of the population. The largest minority groups were Hispanics/Latinos in Rio Arriba and Sandoval Counties and Native Americans in McKinley and San Juan Counties.

Table 15. Study Area County Population by Race/Ethnicity (2008-2012)

Population	McKinley County	Rio Arriba County	Sandoval	San Juan	Study Area	New Mexico	United States	Jicarilla Apache Nation	Navaho Nation	Ute Mountain Nation
Hispanic or Latino ethnicity of any race	9,744	28,714	46,334	24,496	109,288	952,569	50,545,275	382	2,958	99
	13.6%	71.4%	35.3%	19%	29%	46.3%	16.4%	11.6%	1.7%	6.0%
White alone	7,413	5,370	61,977	54,218	128,978	831,543	196,903,968	74	3,762	47
	10.3%	28.6%	47.2%	42.2%	34.67%	40.5%	63.7%	2.3%	2.2%	2.9%
Black or African American alone	353	149	2,704	794	4000	35,586	37,786,591	0	250	5
	0.5%	0.4%	2.1%	0.6%	1.08%	1.7%	12.2%	0%	0.1%	0.3%
American Indian or Alaskan Native alone	52,358	5,629	15,964	46,676	120,627	176,766	2,050,766	2,692	162,920	1,429
	72.8%	14.0%	12.2%	36.3%	32.43%	8.6%	0.7%	82.0%	94.3%	87.0%
Asian alone	506	173	1,685	464	2828	25,411	14,692,794	73	834	14
	0.7%	0.4%	1.3%	0.4%	0.76%	1.2%	4.8%	2.2%	0.5%	0.9%
Native Hawaiian and Other Pacific Islander alone	38	7	100	72	217	989	480,063	0	209	0
	0.1%	0%	0.1%	0.1%	0.06%	<.01%	0.2%	0%	0.1%	0%
Some Other Race	7	22	437	84	550	3,623	616,191	0	102	0
	<.01%	0.1%	0.3%	0.1%	0.15%	0.2%	0.2%	0%	0.1%	0%
Two or more Races	1,469	137	2,101	1,796	5,503	28,800	6,063,063	62	1,660	49
	2.0%	0.3%	1.6%	1.4%	1.48%	1.4%	2.0%	1.9%	1.0%	3.0%
Classified as Minority Population based on CEQ guidelines?	Yes	Yes	Yes	Yes		Yes	NA	Yes	Yes	Yes

Source: US Census Bureau 2012b
Note: American Community Survey estimates are based on data collected over a 5-year time period. The estimates represent the average characteristics of populations between January 2008 and December 2012 and do not represent a single point in time

Based on the CEQ definition of a minority population area (minority residents exceed 50 percent of all residents), Bernalillo, Bloomfield, Espanola, and Gallup all are considered minority communities.

When examined at the Census Tract level, there are 24 out of 87 tracts that have a minority population greater than 50 percent. These range from Census Tract 6.1 located just north of the city of Aztec with a minority population of 80.5 percent to Census Tract 107.17 located north of the city of Rio Rancho with a minority population of 50.2 percent (US Census Bureau 2012b). These Census Tracts are relatively small and are based around the city of Rio Rancho and the Aztec/Farmington/Bloomfield area.

Native American Populations

Data in Table 15 account for a substantial portion of the study area population in some areas, notably McKinley and San Juan Counties, where the population is 72.8 and 36.3 percent American Indian respectively. Three tribal governments have reservations within the planning area: the Jicarilla Apache

Nation, the Navajo Nation, and the Ute Mountain Nation (Table 16). The Southern Ute Nation has lands just north of the planning area in the state of Colorado, but none within the planning area. Almost one half of the planning area is tribal lands. Each tribe maintains a general concern for protection of and access to areas of traditional and religious importance, and the welfare of plants, animals, air, landforms, and water on reservation and public lands. Policies established in 2006 by the BLM and US Forest Service, in coordination with Federal tribes, ensure access by traditional native practitioners to area plants. The policy also ensures that management of these plants promotes ecosystem health for public lands. The BLM is encouraged to support and incorporate into their planning traditional native and native practitioner plant-gathering for traditional use (Boshell 2010).

Table 16. Tribal Nations in the Planning Area

Tribe	Acres in Planning Area	General Location
Jicarilla Apache Nation	739,600	The majority of the Jicarilla Apache Nation is located in western Rio Arriba County, but within the eastern portion of the planning area
Navajo Nation	860,900	A portion of the Navaho Nation extends into western San Juan County and into the western portion of the planning area
Ute Mountain Nation	103,500	A portion of the Ute Mountain Nation extends into the northern portion of San Juan County, just east of the Navajo Nation, and into the northern portion of the planning area
Unknown	196,300	Lands located in the southern portion of the planning area [Note to BLM: this is due to inconsistencies between US Census Bureau tribal areas dataset and BLM land status dataset.]
Source: BLM GIS 2014, US Census Bureau 2014		

3.12.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. No new surface disturbance would occur, and existing economic resources within the proposed project area would not be impacted.

3.12.3. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The proposed project would result in no disproportionate, negative effects to minority or low-income populations. The proposed project would not negatively affect socioeconomics in the region.

There are no occupied or abandoned houses within a one-mile radius of the proposed project area. Therefore, no negative, direct effects to individuals, groups, or communities would be expected.

Indirectly, there could be positive, short- and/or long-term effects to socioeconomics associated with the proposed project. The proposed project could contribute to employment opportunities in the oil and gas industry. In addition, there could be taxes and royalties to state and county governments as a result of the proposed project.

Cumulative Impacts

The spatial analysis area for the proposed project is the BLM-FFO planning area. In the BLM-FFO planning area, the oil and gas industry is the dominant force in the economy. In New Mexico, the oil and gas industry provides nearly one billion dollars per year in taxes, royalties, and interest to the State; at least half of this is related to oil and gas production in the San Juan Basin. This industry is a primary employer and provides higher paying jobs than many other job sectors available to the population. As of 2000, over 11,000 people in northwestern New Mexico were employed in the industry. Overall, the positive effects of oil and gas development in the spatial analysis area are expected to outweigh any changes in jobs, expenditures, or revenues resulting from any other actions expected or likely in the

region (BLM 2003a, 3-99 – 3-100). The proposed project would contribute to this positive cumulative impact.

3.13. Public Health and Safety

3.13.1. Affected Environment

Worker safety is regulated under the Occupational Safety and Health Act of 1970, as amended (29 USC 651). Additional safety regulations found in Pipeline Safety Programs and Rulemaking Procedures (49 CFR 190) and Transportation of Natural and Other Gas by Pipeline: Minimal Federal Safety Standards (40 CFR 192) apply to natural gas pipelines.

The proposed project area is remote. The nearest town, Nageezi, New Mexico (population 286 [U.S. Census Bureau 2010]) is approximately 20 miles northeast of the proposed project area. The community of Counselor, New Mexico and U.S. Highway 550 are approximately 4 miles northwest of the proposed project area. There are no designated recreation areas, commercial areas, or occupied residential areas within one mile of the proposed project area. However, the location is accessible to the public by dirt roads.

The nearest hospital is in Farmington, New Mexico. This hospital is approximately 60 aerial miles or approximately 71 road miles (6 miles of dirt road and 65 miles of paved road) from the proposed project.

3.13.2. Impacts from Alternative A: No Action Alternative

Under the No Action alternative, the proposed project would not be constructed and the two associated oil and natural gas wells would not be drilled. No new surface disturbance would occur, and public health and safety within the proposed project area would not be impacted.

3.13.3. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

As a result of the proposed project, short-term effects to public health and safety would be low to moderate. For the long term, effects to public health and safety would be low.

The proposed project would affect transportation. During construction, the proposed project would result in increased traffic on area roads; some vehicles would be hauling heavy equipment. Therefore, there would be an increased potential for traffic accidents. Dust associated with construction activities or travel on dirt access roads may result in poor visibility in the area. The increased use of dirt access roads during muddy conditions may worsen the roads' conditions. The access road associated with the proposed Lybrook P12 project would include a pullout area that would be an improvement to safety conditions for workers traveling to and from the proposed project area. Following construction, traffic levels would be similar to current levels; long-term effects on transportation would be low.

During construction, drilling, and maintenance activities, the operation of heavy equipment poses potential safety concerns. Existing facilities (such as oil and gas wells, pipelines, and powerlines) could be damaged or ruptured, posing a risk to human safety.

During the operation of the proposed wells, facility failure (such as pipeline ruptures) could represent a potential danger to the public.

Hazardous and solid wastes associated with the proposed projects are discussed in Section 2.1.2. (Description of Proposed Projects – Design Features and Best Management Practices - Control of Waste). As a result of the proposed project, the public could be exposed to hazardous materials.

Cumulative Impacts

The general BLM-FFO region has been developed by the oil and gas industry for over six decades, which contributes to public health and safety concerns in the area.

Transportation issues are a primary safety concern. Vehicles associated with the oil and gas industry utilize the developed highway and county road systems. In addition, the oil and gas industry constructs and utilizes dirt access roads in the area. These roads, most of which are accessible by the public, are often hazardous, particularly during and following periods of inclement weather.

Additional safety concerns in the region include wildfire; oil and gas facility leakage or rupture; moving equipment (such as pump jacks); oil and gas explosions; and the handling, storage, and disposal of wastes, chemicals, or condensate. Hazardous and solid wastes are discussed in Section 2.1.2. (Description of Proposed Projects – Design Features and Best Management Practices - Control of Waste).

The proposed project would contribute minimally to the cumulative public safety impacts in the region.

4. SUPPORTING INFORMATION

4.1. Tribes, Individuals, Organizations, or Agencies Consulted

Table 17, Table 18, and Table 19 contain a list of tribes, individuals, organizations, and agencies invited to attend the on-site meetings for the project.

Table 17. Tribes, Individuals, Organizations, and Agencies Invited to the March 20, 2013 On-Site

Name	Tribe, Organization, or Agency	Attended On-Site
Jason Eckman	Encana	Yes
Roger Herrera	BLM-FFO	Yes
Amber Ballman	NCI	Yes
Steve Fuller	LAC	Yes
Johnny Stinson	Adobe	Yes
Jacob Brown	NCE	Yes
	Local Chapter House - Navajo Nation	No

Table 18. Tribes, Individuals, Organizations, and Agencies Invited to the July 9, 2014 On-Site

Name	Tribe, Organization, or Agency	Attended On-Site
Steven Merrell	Encana	Yes
Benny Benfield	Encana	Yes
Mathew Fenton	Encana	Yes
Bud Kramme	Walsh	Yes
Roger Herrera	BLM-FFO	Yes
Scott Hall	BLM-FFO	Yes
Esther Willeto	BLM-FFO	Yes
Eric Creeden	NCI	Yes
Steve Fuller	LAC	Yes
Jacob Brown	NCE	Yes
Bryan Wilson	NCE	Yes

Table 19. Tribes, Individuals, Organizations, and Agencies Invited to the July 16, 2014 On-Site

Name	Tribe, Organization, or Agency	Attended On-Site
Steven Merrell	Encana	Yes
Roger Herrera	BLM-FFO	Yes
Amber Ballman	NCI	Yes
Fred Harden	LAC	Yes
Melinda Ciocco	Navajo Nation Historic Preservation Department	Yes
Tamara Billie	Navajo Nation Historic Preservation Department	Yes
	Local Chapter House - Navajo Nation	No

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

The New Mexico BLM has a two-party protocol with the New Mexico SHPO specifically encouraged by the NPA. This protocol details how the New Mexico BLM and SHPO will regulate their relationship and consult. Specifically, this document outlines among other things, how and when consultation will be

conducted between the BLM, SHPO, Tribes, and the public. The protocol also outlines when case-by-case SHPO consultation is or is not required for specific undertakings and the procedures for evaluating the effects of common types of undertakings and resolving adverse effects to historic properties. These common types of undertakings regularly include the common actions undertaken in the BLM-FFO.

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:

- Eric Creeden, Senior Environmental Scientist, NCI
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- Sheila Williams, District Botanist, BLM-FFO
- John Kendall, Wildlife Management Biologist, BLM-FFO
- Jim Copeland, Archaeologist, BLM-FFO
- Sherrie Landon, Paleontologist, BLM-FFO
- Esther Willetto, Tribal Program Coordinator, BLM-FFO
- Jeff Tafoya, Range Specialist, BLM-FFO
- Scott Hall, Realty Specialist, BLM-FFO
- Roger Herrera, Environmental Protection Specialist, BLM-FFO

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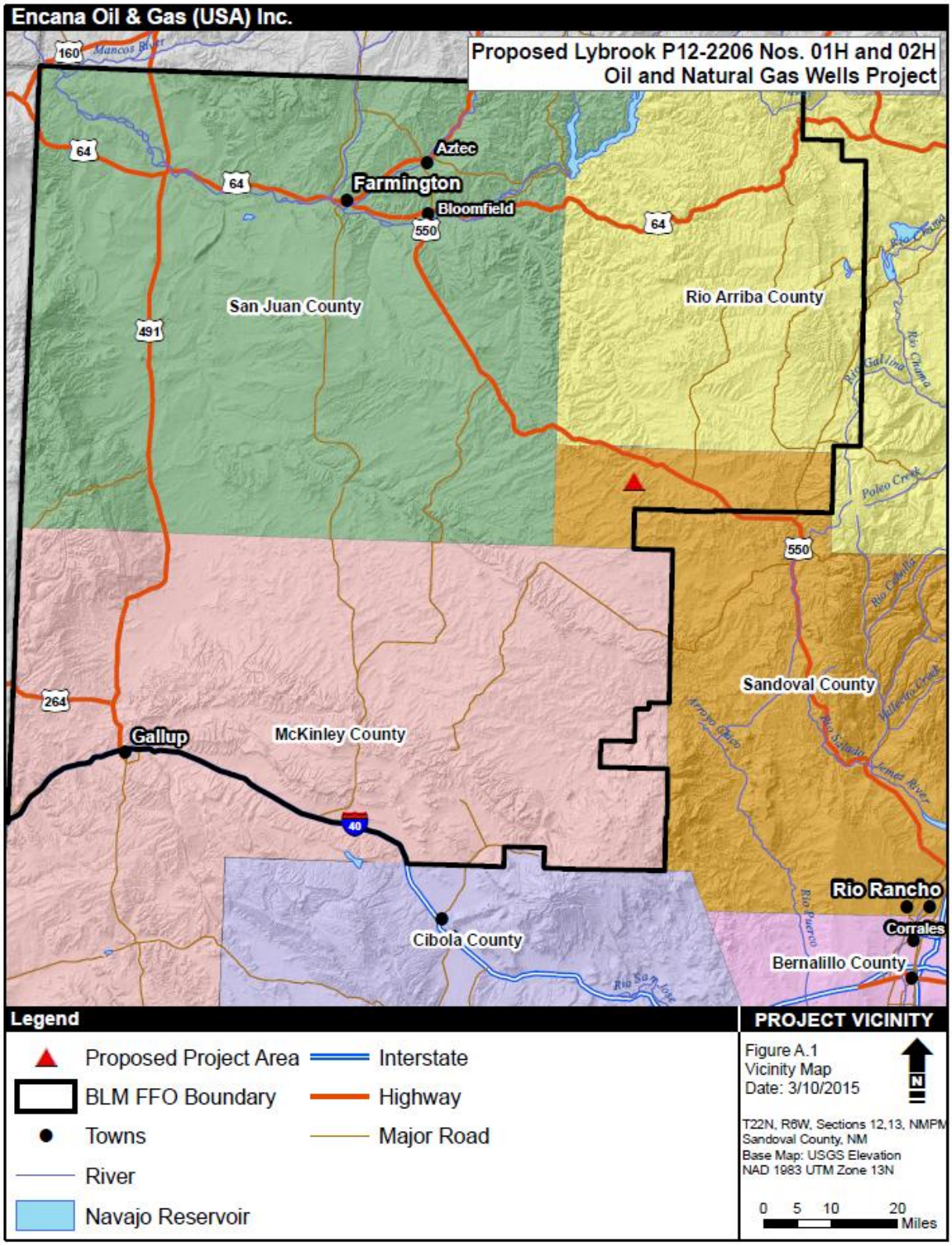
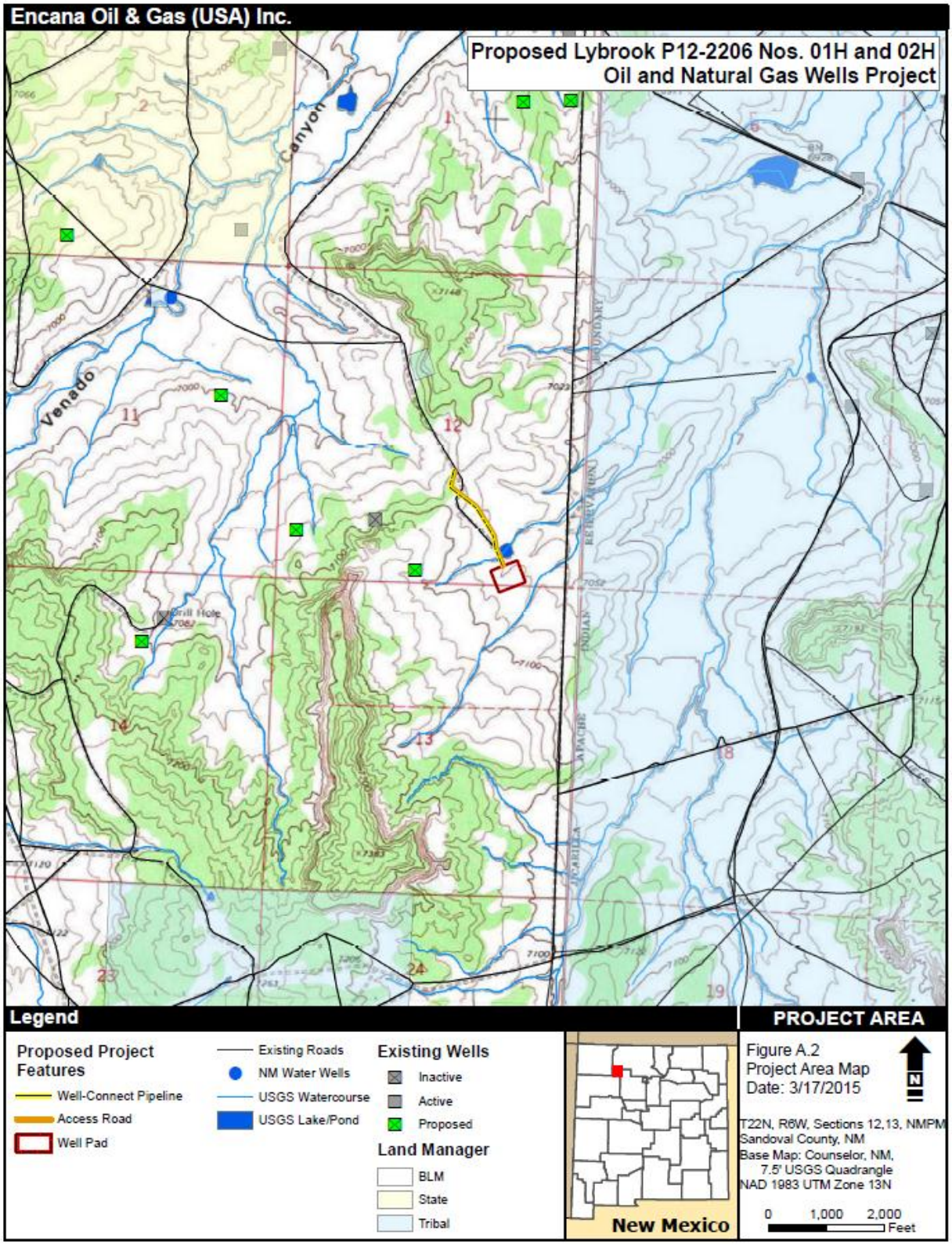
APPENDIX A. MAPS

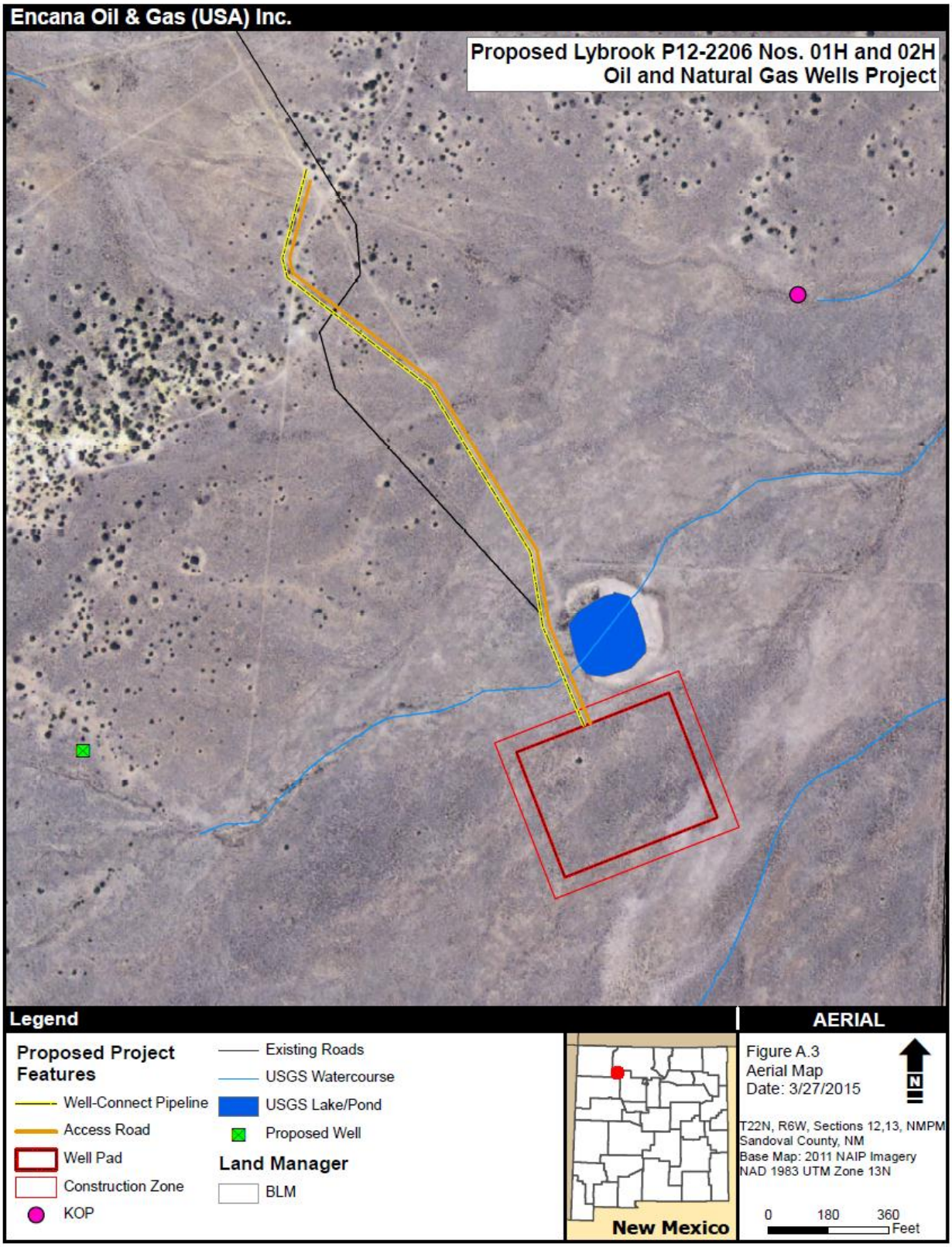
A.1. Vicinity Map



A.2. Project Area Map



A.3. Aerial Map



APPENDIX B. PLATS

District I
1625 N. French Dr., Hobbs, NM 88240
Phone (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., 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 Dr., 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 Dr.
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
	LYBROOK P12–2206	01H

[7] OGRID No.	[8] Operator Name	[9] Elevation
282327	ENCANA OIL & GAS (USA) INC.	7067.2'

[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
P	12	22N	6W		147	SOUTH	1225	EAST	SANDOVAL

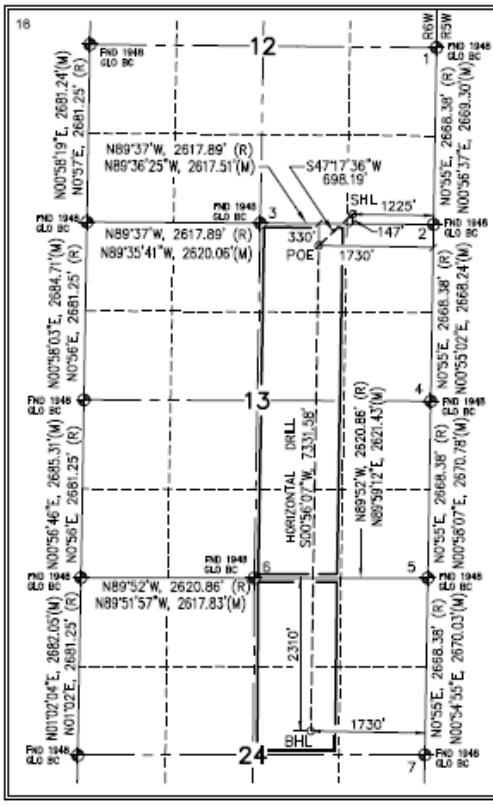
[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West Line	County
G	24	22N	6W		2310	NORTH	1730	EAST	SANDOVAL

[12] Dedicated Acres	PROJECT AREA	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
240.94 Acres	W/2 E/2 – Section 13 W/2 NE/4 – Section 24			

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.

[16]



LYBROOK P12–2206 01H WELL

SHL (WELL FLAG)
LAT. 36.145101°N (NAD83)
LONG. 107.415828°W (NAD83)
LAT. 36.145086°N (NAD27)
LONG. 107.415225°W (NAD27)

POE (POINT OF ENTRY)
LAT. 36.143800°N (NAD83)
LONG. 107.417564°W (NAD83)
LAT. 36.143785°N (NAD27)
LONG. 107.416961°W (NAD27)

BHL (BOTTOM HOLE LOCATION)
LAT. 36.123670°N (NAD83)
LONG. 107.417958°W (NAD83)
LAT. 36.123654°N (NAD27)
LONG. 107.417355°W (NAD27)

SECTION CORNERS
1 LAT. 36.152004°N (NAD83)
LONG. 107.411544°W (NAD83)
LAT. 36.151989°N (NAD27)
LONG. 107.410941°W (NAD27)
2 LAT. 36.144675°N (NAD83)
LONG. 107.411689°W (NAD83)
LAT. 36.144660°N (NAD27)
LONG. 107.411086°W (NAD27)
3 LAT. 36.144721°N (NAD83)
LONG. 107.420551°W (NAD83)
LAT. 36.144707°N (NAD27)
LONG. 107.419948°W (NAD27)
4 LAT. 36.137349°N (NAD83)
LONG. 107.411831°W (NAD83)
LAT. 36.137334°N (NAD27)
LONG. 107.411228°W (NAD27)
5 LAT. 36.130016°N (NAD83)
LONG. 107.411980°W (NAD83)
LAT. 36.130001°N (NAD27)
LONG. 107.411377°W (NAD27)
6 LAT. 36.130011°N (NAD83)
LONG. 107.420854°W (NAD83)
LAT. 36.129996°N (NAD27)
LONG. 107.420250°W (NAD27)
7 LAT. 36.122685°N (NAD83)
LONG. 107.412121°W (NAD83)
LAT. 36.122670°N (NAD27)
LONG. 107.411518°W (NAD27)

[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.

November 3, 2014
Date of Survey

Signature and Seal of Professional Surveyor:

RICHARD L. MULLIKEN
NEW MEXICO
16873
2-03-15
PROFESSIONAL SURVEYOR

RICHARD L. MULLIKEN
Certificate Number 16873

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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
	LYBROOK P12–2206	02H

[7] OGRID No.	[8] Operator Name	[9] Elevation
282327	ENCANA OIL & GAS (USA) INC.	7067.2'

[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
P	12	22N	6W		159	SOUTH	1197	EAST	SANDOVAL

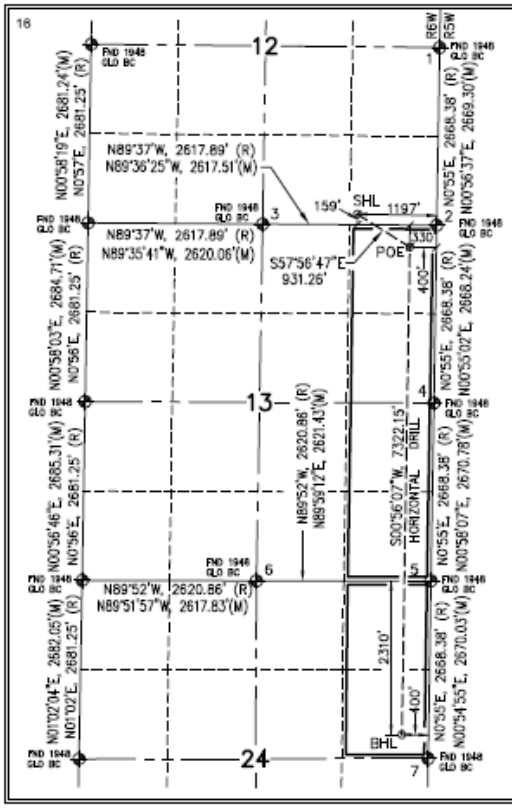
[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West Line	County
H	24	22N	6W		2310	NORTH	400	EAST	SANDOVAL

[12] Dedicated Acres	PROJECT AREA	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
240.64 Acres	E/2 E/2 – Section 13 E/2 NE/4 – Section 24			

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.

[16]



LYBROOK P12–2206 02H WELL

SHL (WELL FLAG)
LAT. 36.145132°N (NAD83)
LONG. 107.415734°W (NAD83)
LAT. 36.145118°N (NAD27)
LONG. 107.415131°W (NAD27)

POE (POINT OF ENTRY)
LAT. 36.143776°N (NAD83)
LONG. 107.413061°W (NAD83)
LAT. 36.143761°N (NAD27)
LONG. 107.412458°W (NAD27)

BHL (BOTTOM HOLE LOCATION)
LAT. 36.123672°N (NAD83)
LONG. 107.413456°W (NAD83)
LAT. 36.123657°N (NAD27)
LONG. 107.412853°W (NAD27)

SECTION CORNERS
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LONG. 107.411544°W (NAD83)
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[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

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[18] SURVEYOR CERTIFICATION

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November 3, 2014
Date of Survey

Signature and Seal of Professional Surveyor

RICHARD L. MULLIKEN
NEW MEXICO
16873
1-28-15
PROFESSIONAL SURVEYOR

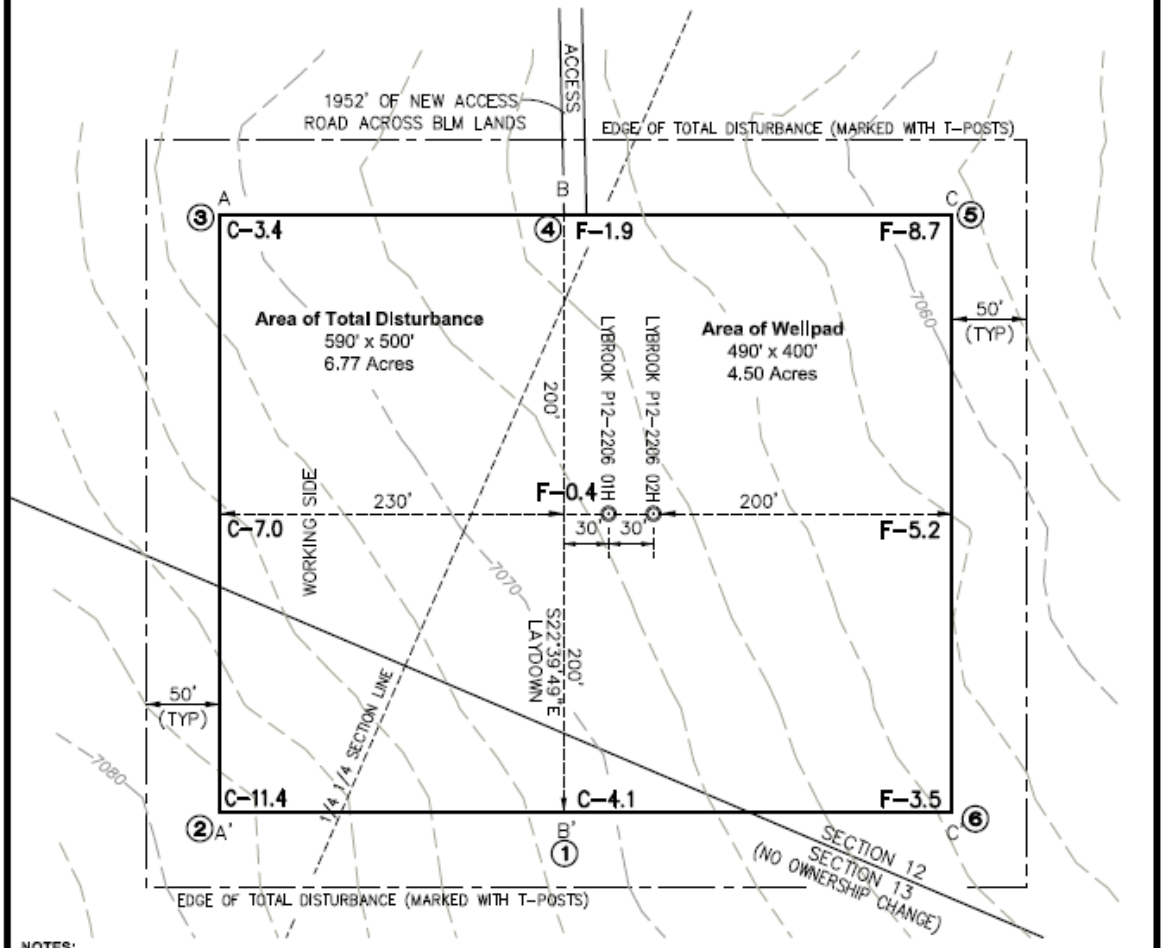
RICHARD L. MULLIKEN
Certificate Number 16873

WELL FLAG
LATITUDE: 36.145132° N
LONGITUDE: 107.415734° W
DATUM: NAD83

ENCANA OIL & GAS (USA) INC.

LYBROOK P12-2206 #02H
159' FSL & 1197 FEL
LOCATED IN THE SE/4 SE/4 OF SECTION 12
T22N, R06W, N.M.P.M.
SANDOVAL COUNTY, NEW MEXICO
EXISTING GROUND ELEVATION: 7066.7', NAVD 88
FINISHED PAD ELEVATION: 7067.2', NAVD 88

~ SURFACE OWNERSHIP ~
Bureau of Land Management
SECTION 12



NOTES:

1.) Basis of Bearings: Between found monuments at the Southeast corner and East One-Quarter corner of Section 12, T22N, R6W, N.M.P.M. Line bears: N00°56'37"E, 2669.30'

2.) Wasatch Surveying and Encana Oil & Gas (USA) Inc. are not liable for underground utilities or pipelines. Contractor should call One-Call for location of any marked or unmarked, buried pipelines or cables on well pad, in construction zone and/or access road at least two (2) working days prior to construction.

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

TOTAL PERMITTED AREA
590' x 500' = 6.77 ACRES
JOB No. 14-07-93 REV-1
DATE: 1/27/15
DRAWN BY: CJT

N

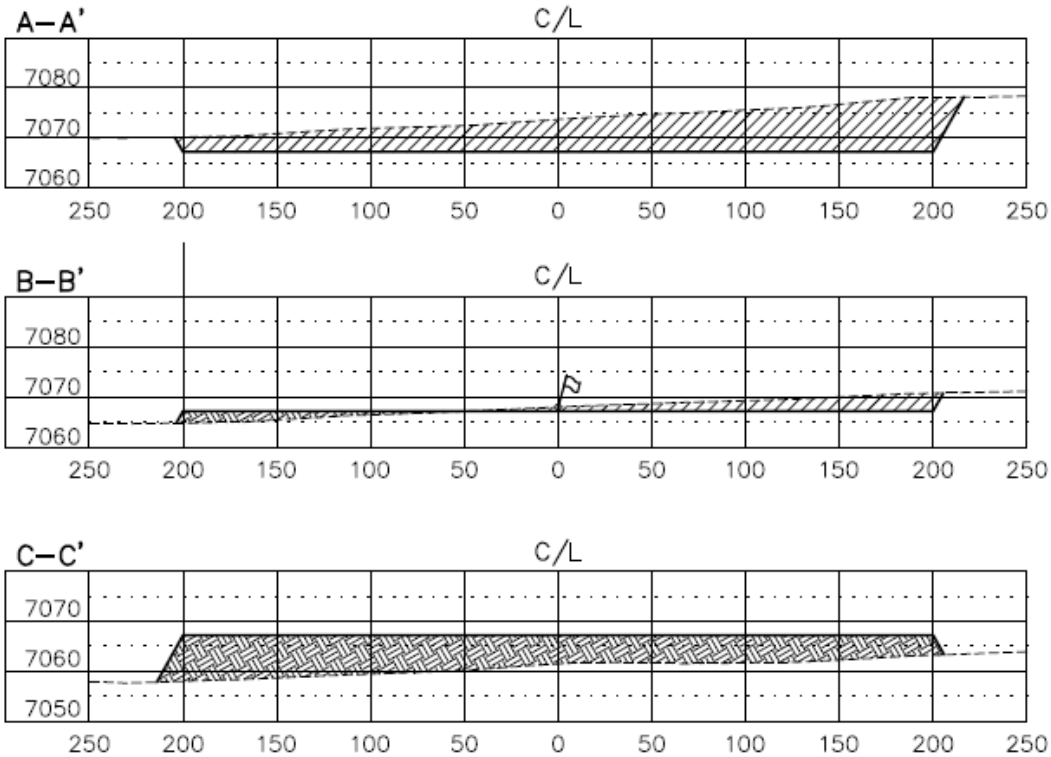
100' 0' 100'
SCALE: 1" = 100'

DATUM NOTE:
Datum NAD83(2011) Epoch 2010.000 (GRS80)
Projection Type = Transverse Mercator
Origin Latitude = 36°15'00" North
Origin Longitude = 107°52'30" West
Scale Reduction = 1.000 297 195 Unitless
Units = U.S. Survey Foot (USSF)
GEOID12a NAVD88
(WSA Local Coord Sys: Counselor)

WASATCH SURVEYING
WASATCH SURVEYING ASSOCIATES
906 MAIN STREET, EVANSTON, WY 82930
(307) 789-4545

WELL FLAG
LATITUDE: 36.145132° N
LONGITUDE: 107.415734° W
DATUM: NAD83

ENCANA OIL & GAS (USA) INC.
LYBROOK P12-2206 #02H
159' FSL & 1197 FEL
LOCATED IN THE SE/4 SE/4 OF SECTION 12
T22N, R06W, N.M.P.M.
SANDOVAL COUNTY, NEW MEXICO
EXISTING GROUND ELEVATION: 7066.7', NAVD 88
FINISHED PAD ELEVATION: 7067.2', NAVD 88

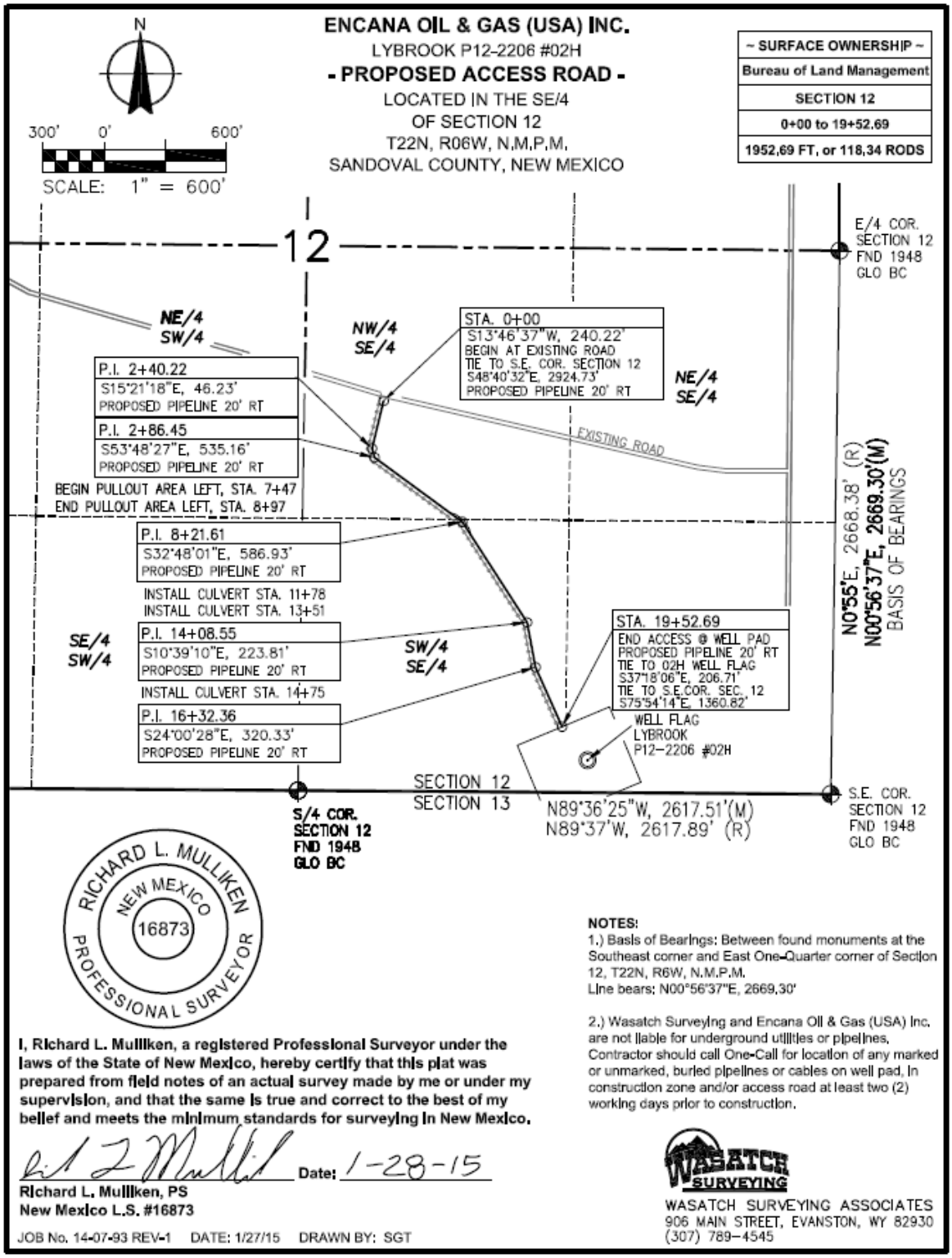


CUT
FILL

HORIZ. SCALE: 1" = 80'
VERT. SCALE: 1"= 30'
JOB No. 14-07-93 REV-1
DATE: 1/27/15

NOTE:
Wasatch Surveying and Encana Oil & Gas (USA) Inc, are not liable for underground utilities or pipelines. Contractor should call One-Call for location of any marked or unmarked, buried pipelines or cables on well pad, in construction zone and/or access road at least two (2) working days prior to construction.

WASATCH SURVEYING
WASATCH SURVEYING ASSOCIATES
905 MAIN STREET, EVANSTON, WY 82930
(307) 789–4545


ENCANA OIL & GAS (USA) INC.
LYBROOK P12-2206 #02H
- PROPOSED ACCESS ROAD -
LOCATED IN THE SE/4
OF SECTION 12
T22N, R06W, N.M.P.M.
SANDOVAL COUNTY, NEW MEXICO
~ SURFACE OWNERSHIP ~
Bureau of Land Management
SECTION 12
0+00 to 19+52.69
1952.69 FT, or 118.34 RODS
N
300' 0' 600'
SCALE: 1" = 600'
12
E/4 COR.
SECTION 12
FND 1948
GLO BC
NE/4
SW/4
NW/4
SE/4
NE/4
SE/4
STA. 0+00
S13°46'37"W, 240.22'
BEGIN AT EXISTING ROAD
TIE TO S.E. COR. SECTION 12
S48°40'32"E, 2924.73'
PROPOSED PIPELINE 20' RT
P.I. 2+40.22
S15°21'18"E, 46.23'
PROPOSED PIPELINE 20' RT
P.I. 2+86.45
S53°48'27"E, 535.16'
PROPOSED PIPELINE 20' RT
EXISTING ROAD
BEGIN PULLOUT AREA LEFT, STA. 7+47
END PULLOUT AREA LEFT, STA. 8+97
P.I. 8+21.61
S32°48'01"E, 586.93'
PROPOSED PIPELINE 20' RT
INSTALL CULVERT STA. 11+78
INSTALL CULVERT STA. 13+51
SE/4
SW/4
P.I. 14+08.55
S10°39'10"E, 223.81'
PROPOSED PIPELINE 20' RT
SW/4
SE/4
INSTALL CULVERT STA. 14+75
P.I. 16+32.36
S24°00'28"E, 320.33'
PROPOSED PIPELINE 20' RT
STA. 19+52.69
END ACCESS @ WELL PAD
PROPOSED PIPELINE 20' RT
TIE TO 02H WELL FLAG
S37°18'06"E, 206.71'
TIE TO S.E.COR. SEC. 12
S75°54'14"E, 1360.82'
WELL FLAG
LYBROOK
P12-2206 #02H
N0°55'E, 2668.38' (R)
N00°56'37"E, 2669.30'(M)
BASIS OF BEARINGS
SECTION 12
SECTION 13
S/4 COR.
SECTION 12
FND 1948
GLO BC
N89°36'25"W, 2617.51'(M)
N89°37'W, 2617.89' (R)
S.E. COR.
SECTION 12
FND 1948
GLO BC
RICHARD L. MULLIKEN
NEW MEXICO
16873
PROFESSIONAL SURVEYOR
NOTES:
1.) Basis of Bearings: Between found monuments at the Southeast corner and East One-Quarter corner of Section 12, T22N, R6W, N.M.P.M.
Line bears: N00°56'37"E, 2669.30'
2.) Wasatch Surveying and Encana Oil & Gas (USA) Inc. are not liable for underground utilities or pipelines. Contractor should call One-Call for location of any marked or unmarked, buried pipelines or cables on well pad, in construction zone and/or access road at least two (2) working days prior to construction.
I, Richard L. Mulliken, 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 made by me or under my supervision, and that the same is true and correct to the best of my belief and meets the minimum standards for surveying in New Mexico.
Date: 1-28-15
Richard L. Mulliken, PS
New Mexico L.S. #16873
JOB No. 14-07-93 REV-1 DATE: 1/27/15 DRAWN BY: SGT
WASATCH SURVEYING
WASATCH SURVEYING ASSOCIATES
906 MAIN STREET, EVANSTON, WY 82930
(307) 789-4545

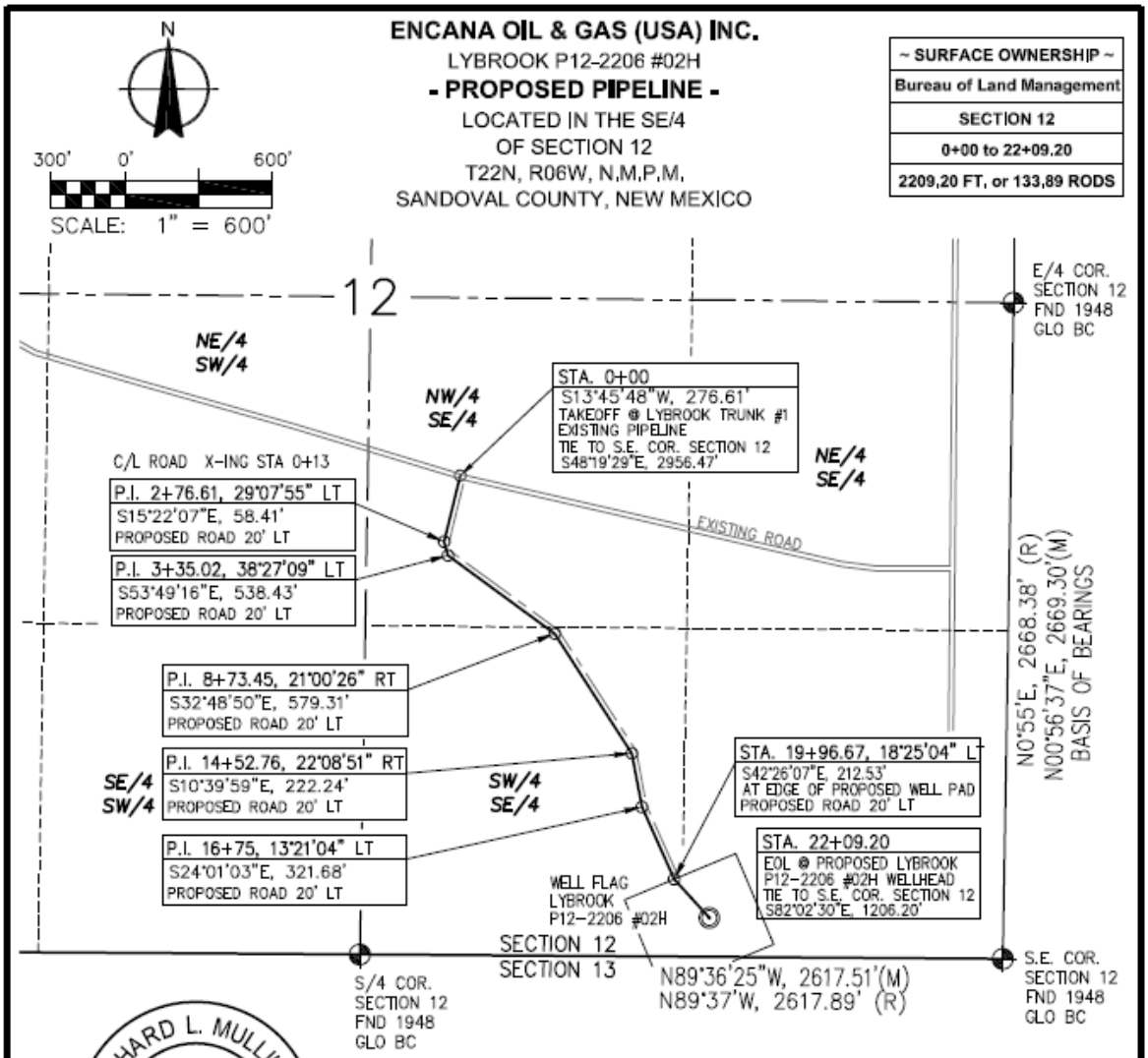
ENCANA OIL & GAS (USA) INC.

LYBROOK P12-2206 #02H

- PROPOSED PIPELINE -

LOCATED IN THE SE/4
OF SECTION 12
T22N, R06W, N.M.P.M.
SANDOVAL COUNTY, NEW MEXICO

~ SURFACE OWNERSHIP ~
Bureau of Land Management
SECTION 12
0+00 to 22+09.20
2209.20 FT, or 133.89 RODS



RICHARD L. MULLIKEN
NEW MEXICO
16873
PROFESSIONAL SURVEYOR

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Date: 1-28-15

Richard L. Mulliken, PS
New Mexico L.S. #16873

JOB No. 14-07-93 REV-1 DATE: 1/27/15 DRAWN BY: SGT

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WASATCH SURVEYING

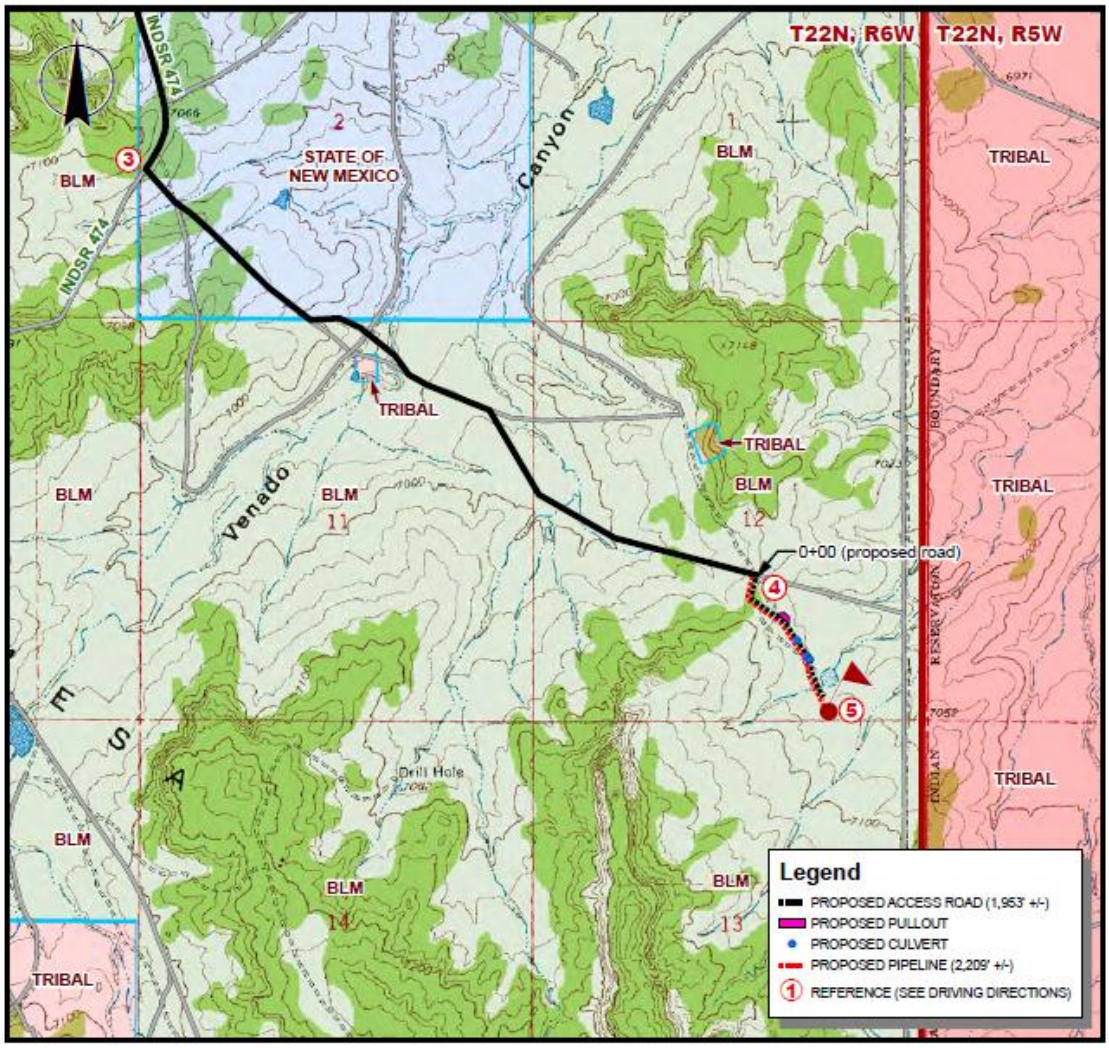
WASATCH SURVEYING ASSOCIATES
906 MAIN STREET, EVANSTON, WY 82930
(307) 789-4545

LATITUDE: 36.145132° N
LONGITUDE: 107.415734° W
DATUM: NAD 83

ENCANA OIL & GAS (USA) INC.

LYBROOK P12-2206 #02H
159' FSL & 1197' FEL
LOCATED IN THE SE/4 SE/4 OF SECTION 12
T22N, R06W, N.M.P.M.
SANDOVAL COUNTY, NEW MEXICO

1,953' +/- OF NEW ACCESS



U.S.G.S QUAD: COUNSELOR
SCALE: 1" = 2000' (1:24,000)
JOB No.: 14-07-93 REV1
DATE: 1/27/2015
DRAWN BY: SMM
SHEET 1 OF 1

WASATCH SURVEYING ASSOCIATES
906 MAIN STREET, EVANSTON, WY 82930
(307) 789-4545

CONSTRUCTION DETAILS

NEW ACCESS
07+47 BEGIN PULLOUT LEFT
08+97 END PULLOUT LEFT
11+78 INSTALL CULVERT 24"
13+51 INSTALL CULVERT 24"
14+75 INSTALL CULVERT 24"

APPENDIX C. PHOTOGRAPHS

Well Pad: View from wellheads, looking northward

Well Pad: View from wellheads, looking southward

Well Pad: View from wellheads, looking westward

Well Pad: View from wellheads, looking eastward

Access Road and Well-Connect Pipeline Corridor: View from northern terminus of proposed access road and well-connect pipeline corridor, looking southeastward

Access Road and Well-Connect Pipeline Corridor: View from southern terminus of proposed access road and well-connect pipeline corridor (from well pad), looking northward towards an existing stock pond

Existing stock pond, located north of the northeastern corner of the proposed well pad, looking westward

KOP from existing road, toward proposed project area, looking south, southwest.

APPENDIX D. VISUAL CONTRAST RATING WORKSHEETS

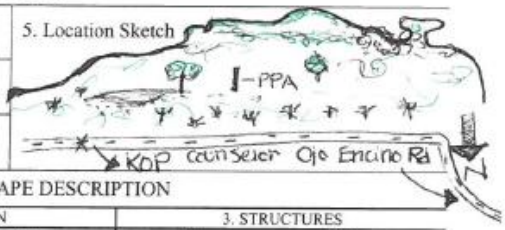
Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRACT RATING WORKSHEET

Date: March 24, 2015
District Office:
Field Office: Farmington
Activity (program): Oil and Gas

SECTION A: PROJECT INFORMATION

1. Project Name: Encana's Lybrook P12-2206
2. Key Observation Point: GPS Waypoint #002 on Existing Road
3. VRM Class: Class III / IV
4. Location: Township 22N; Range 6W; Section 12 & 13
5. Location Sketch



SECTION B: CHARACTERISTICS LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to Gently Rolling Terrain Tall mesas to the Southwest	Simple forms created by vegetative patterns	No Structures Present N/A
LINE	Foreground = Horizontal Back Ground = Vertical/diagonal	Mostly horizontal to weak and undulating	N/A
COLOR	Tan/Beige	Light to Dark (sagebrush and juniper) Green Sudan brown	N/A
TEX-TURE	Mostly smooth Background = Jagged, rough grainy	Smooth to course	N/A

SECTION C: PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Mostly Flat	geometric forms created by clearings	Angular, geometric, cylindrical
LINE	Horizontal (well pad) Curved (road)	Strong irregular lines created by edge effect of clearings	Vertical & horizontal
COLOR	Beige/Tan	(sagebrush) light green	Covert green
TEX-TURE	Fine to Smooth	Smooth to patchy	Smooth to course

SECTION D. CONTRAST RATING ___SHORT TERM ___LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			X				X				X	
	LINE			X				X				X	
	COLOR			X			X					X	
	TEXTURE			X				X				X	

2. Does the project design meet visual resource management objectives? X Yes ___No (explain on reverse side)

3. Additional mitigating measures recommended ___Yes X No (Explain on reverse side)

Evaluator's Names: Sarah Griffin, John Leonhart
Date: 03/24/2015

GPS Waypoint #002 = 36.149139, -107.414163

Encanas Lybrook P12-2206

SECTION D. (Continued)

Comments from item 2.

Since the project is low lying (and far from major roads) the large mesa located south of the proposed project blocks the view from Chaco Canyon.

Additional Mitigating Measures (See item 3)

The color of the proposed project structures should allow for blending with the landscape

APPENDIX E. RECLAMATION PLAN