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Encana Oil & Gas (USA) Inc.'s Lybrook A12-2306 No. 01H & Lybrook O01-2306 Nos. 01H & 02H Oil and Natural Gas Wells Projects

(ATS-F010-14-23 and ATS-F010-14-24)

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1. PURPOSE AND NEED FOR ACTION

1.1. Background

Encana Oil & Gas (USA) Inc. (Encana) has submitted three Applications for Permit to Drill (APDs) and seven Right-of-Way (ROW) Grant applications to the Bureau of Land Management – Farmington Field Office (BLM-FFO) for the following oil and natural gas well projects:

- **Lybrook A12-2306 No. 01H (Lybrook A12)**
  The proposed Lybrook A12 project would include the horizontal drilling, possible production, and final abandonment of one oil and natural gas well (permitted via an approved APD). The proposed project would include the construction, use, and reclamation of approximately 15.2 acres of previously undisturbed surface. The proposed well pad, access road, and pipeline corridor would each be permitted under a separate ROW Grant. Temporary use areas (TUAs) would all be permitted under one additional ROW Grant. Proposed surface features are listed below:
    - One 2,820-foot-long access road
    - One 5.7-acre well pad (including construction zone)
    - One 5,801-foot-long pipeline corridor, which would parallel the proposed access road and existing roads
    - Six TUAs, totaling 4.3 acres of new surface disturbance
- **Lybrook O01-2306 Nos. 01H and 02H (Lybrook O01)**
  The proposed Lybrook O01 project would include the horizontal drilling, possible production, and final abandonment of two oil and natural gas wells (permitted via two approved APDs). The proposed project would include the construction, use, and reclamation of approximately 10.6 acres of previously undisturbed surface. The proposed well pad, access road, and pipeline corridor would each be permitted under a separate ROW Grant. Proposed surface features are listed below:
    - One 6,037-foot-long access road, 4,137 feet of which would overlap an existing road
    - One 5.9-acre well pad (including construction zone)
    - One 6,089-foot-long pipeline corridor, which would parallel the proposed access road

In addition, approximately 1,940 feet of an existing access road would be closed and reclaimed.

The proposed wells associated with the proposed projects would access federal minerals managed by the BLM-FFO. The proposed project areas are located on BLM-FFO surface.

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

for roofing; waxes for food wrapping; solvents for paints; cosmetics and dry-cleaning products; plastics; and foams (U.S. Energy Information Administration 2012).

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

Taxes and royalties on oil, natural gas, and carbon dioxide production contribute approximately 25 percent of New Mexico's general fund, and the oil and gas industry is one of the largest private sector employers in the state (New Mexico Bureau of Geology and Mineral Resources 2012). Additionally, the federal government receives royalties, or a share of the production income, for extracted federal minerals. In 2011, federal natural gas royalties totaled over 2 billion dollars (Office of Natural Resources Revenue 2012).

The proposed project areas are located within the San Juan Basin in Rio Arriba County, New Mexico. The proposed project areas are approximately 45 miles southeast of Bloomfield, 7 miles east-northeast of Lybrook, and 3 miles north 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 land to develop their mineral lease.

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

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 projects, and if so, under what terms and conditions. Under the National Environmental Policy Act (NEPA; Public Law 91-90, 42 USC 4321 et seq.), the BLM-FFO must determine if there are any significant environmental impacts associated with the proposed action warranting further analysis in an Environmental Impact Statement (EIS). The BLM-FFO Field Manager is the responsible officer who will decide one of the following:

- To approve the 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 2003 BLM-FFO Resource Management Plan (RMP). Pursuant to 40 CFR 1508.28 and 1502.21, this site-specific EA tiers into and incorporates by reference the information and analysis contained in the BLM-FFO Proposed Resource Management Plan/Final

Environmental Impact Statement (PRMP/FEIS; BLM 2003a). The RMP was approved by the September 29, 2003 Record of Decision (ROD; BLM 2003b), and updated in December 2003.

Specifically, the proposed action supports the following BLM policy:

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

Development of energy-related ROWs, including off-lease access roads, pipelines, and well pads, 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 projects 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.

Several USGS watercourses are crossed by the proposed Lybrook A12 access road/pipeline corridor and proposed Lybrook O01 access road. If these watercourses are considered jurisdictional by the USACE, proposed activities associated with these crossings would be permitted under Nationwide Permit Nos. 12 (for Utility Line Activities) and 14 (for Linear Transportation 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 Protocol Agreement between the New Mexico BLM and New Mexico State Historic Preservation Officer, which is authorized by the Programmatic Agreement among the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers (1997).

1.5.3. Clean Air Act

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

1.5.4. New Mexico State Regulations

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

On-site meetings were held for the proposed projects on November 13, 2013. The meetings were attended by Encana, BLM-FFO representatives, and an environmental consultant (Nelson Consulting, Inc. [NCI]). A public invitation to the on-site meetings was posted online (http://www.blm.gov/nm/st/en/fo/Farmington_Field_Office/ffo_oil_and_gas/ffo_onsites.html); no private citizens or groups. A BLM-FFO Interdisciplinary Team meeting was held for both of the proposed projects on November 25, 2013, to discuss the proposed action. At the aforementioned meetings, potential issues of concern were identified by the BLM-FFO and NCI.

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

1.6.2. Issues

Issues Analyzed

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

- How would dust and equipment emissions associated with the proposed projects impact air resources?
- How would surface-disturbing activities associated with construction of the proposed projects impact soil?
- Would drilling the proposed wells impact groundwater?
- How would vegetation-clearing, proposed project activities, and final reclamation associated with the proposed projects impact upland vegetation?
- How would vegetation-clearing, proposed project activities, and final reclamation impact wildlife, including migratory birds?
- How would vegetation-clearing, proposed project activities, and final reclamation impact the following BLM Special Status Species (SSS): American peregrine falcon (*Falco peregrinus anatum),* Bendire's thrasher (*Toxostoma bendirei*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), piñon 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 projects impact cultural resources?
- How would the closure of an existing road in the region impact travel?
- How would vegetation-clearing, proposed project activities, and final reclamation impact livestock?

Issues Considered but not Analyzed

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

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

Under Section 7 of the Endangered Species Act of 1973 (ESA; 16 USC 1531-1544), all federal agencies are required to consult with the USFWS or National Marine Fisheries Service if they are proposing an action that may affect listed species or designated habitat. Consultation with the USFWS was conducted as part of the PRMP/FEIS to address the cumulative effects of RMP implementation (Consultation No. 2-22-01-1-389, Appendix M of the PRMP/FEIS). Based on a review of species currently listed by the USFWS as occurring in Rio Arriba County (USFWS 2013), as well as the location of the proposed project areas and habitat within the proposed project areas, the potential does not exist for USFWS-listed species to occur within the proposed project areas. Water for drilling would be obtained from the permitted SJ01979-S4 water well; no unaccounted-for water depletions within USFWS-listed fish habitat would occur. Therefore, there is no need for additional Section 7 consultation.

Native American Religious Concerns

For the proposed action, identification efforts for Native American Religious Concerns were limited to a review of existing published and unpublished literature (e.g., Van Valkenburgh 1941, 1974; Brugge 1993; Kelly, et al. 2006), a review by the BLM's cultural resources program regarding the presence of Traditional Cultural Properties (TCPs) identified through ongoing BLM tribal consultation efforts, and the development of the following site-specific Class III survey reports prepared for the proposed action:

- Lybrook A12: La Plata Archaeological Consultants [LAC] Report No. 2013-7jj (LAC 2013a; BLM Report No. (2014 II 0107F)
- Lybrook O01: LAC Report No. 2013-7w (LAC 2013b; BLM Report No. (2014II 021F)

There are currently no known remains that fall within the purview of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA; 25 USC 3001) or the Archaeological Resources Protection Act (ARPA; 16 USC 470) within the proposed project areas. The proposed action would not impact any known TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere with or hinder the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act of 1978 (AIRFA; 42 USC 1996) or Executive Order (EO) 13007.

2. PROPOSED ACTION AND ALTERNATIVE(S)

2.1. Proposed Action

The proposed action is the BLM-FFO approval of three APDs and seven ROW Grants associated with Encana's proposed Lybrook A12 and Lybrook O01 projects. An existing road would also be closed. A brief summary of the proposed projects is provided below.

- **Lybrook A12:** The proposed project would include the drilling, production, and final abandonment of one oil and natural gas well and the construction, use, and reclamation of one associated well pad (with construction zone), access road, and pipeline corridor. The proposed project would also include the use and reclamation of six TUAs. The proposed project would be permitted via one APD and four ROW Grants.
- **Lybrook O01:** 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 one associated well pad (with construction zone), access road, and pipeline corridor. The proposed project would be permitted via two APDs and three ROW Grants.
- **Road Closure:** Approximately 1,940 feet of an existing access road would be closed; a portion of this road would be reseeded.

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 projects is proposed for 2014. The scheduled commencement of the proposed projects could be delayed based on the approval of the APDs/issuance date of the ROW Grants or drill rig scheduling.

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

2.1.1. Location of Proposed Project Areas

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

The proposed project areas are located on BLM-FFO surface within the San Juan Basin in Rio Arriba County, New Mexico. The proposed project areas are approximately 45 miles southeast of Bloomfield, 7 miles east-northeast of Lybrook, and 3 miles north of U.S. Highway 550. The proposed well pads are located 1 to 2 miles east-southeast of Escrito Canyon.

The general region surrounding the proposed project areas is characterized by sandstone mesas and shallow valleys. The elevation within the proposed project areas ranges from 6,500 to 6,900 feet above mean sea level (AMSL). Existing and proposed oil and gas lease roads, well pads, and pipeline corridors are in the general vicinity of the proposed project areas.

The legal location (New Mexico Principal Meridian [NMPM]) of the proposed project areas is listed in the below table.

Table 1. Legal Land Description for Proposed Project Features

Project Feature	Legal Location (NMPM)		
	Quarter-Quarter	Section	Township & Range*
Lybrook A12			
Well Pad and Construction Zone	northeastern ¼ of northeastern ¼	12	T23N, R6W
	southeastern ¼ of southeastern ¼	1	
TUA 4			
Access Road	eastern ½ southeastern ¼		
Pipeline Corridor	northwestern ¼ southeastern ¼		
	western ½ northeastern ¼		
	northeastern ¼ northwestern ¼		
TUA 6			
TUA 5	northeastern ¼ southeastern ¼		
TUAs 2 and 3	northwestern ¼ northeastern ¼		
TUA 1	southern ½ northeastern ½	24	T24N, R6W
Lybrook O01			
Well Pad and Construction Zone	southwestern ¼ southeastern ¼	1	T23N, R6W
Pipeline Corridor	southeastern ¼ southwestern ¼		
Access Road	northern ½ southwestern ¼		
	eastern ½ northwestern ¼		
Road Closure			
Existing Road	eastern ½ southwestern ¼	36	T24N, R6W
	northwestern ¼ southeastern ¼		
*T: Township, R: Range, N: North, W: West			

Lybrook A12

The proposed Lybrook A12 well pad and surrounding construction zone are located on the western side of Gallo Canyon, a shallow tributary to Largo Canyon. Terrain within the proposed well pad and construction zone is even to gently rolling, and there is a gentle slope to the east. Gallo Wash is approximately 400 feet east of the proposed well pad. The elevation within the proposed well pad and

construction zone ranges from approximately 6,600 to 6,700 feet AMSL. There is an existing north-south-running road approximately 90 feet east of the proposed well pad. A fence line is present along the western edge of this road. This fence line and road travel along or near the boundary between the BLM and the Jicarilla Apache Nation (JAN); there is currently some dispute regarding the exact location of the boundary, and it is possible that the road is located on the JAN.

The proposed Lybrook A12 access road travels north-northwestward from the proposed well pad. The southeastern portion of the proposed access road is located within the even to rolling lowlands of Gallo Canyon. The road then turns westward, traversing a steep sandstone ridge and sandstone outcroppings associated with the western wall of Gallo Canyon. TUA 4 (needed for road construction) would be located adjacent to the proposed access road along this steep stretch of the corridor. Near the northwestern terminus of the proposed access road, the road travels through El Paso Natural Gas's inactive, reclaimed Bolack E No. 4 well pad; TUA 5 (for vehicle staging) would be located within this well pad. The northwestern terminus of the proposed access road is located within gently rolling terrain on uplands between Gallo Canyon and Escrito Canyon. The northwestern terminus of the proposed access road is located at the edge of the existing access road to M&M Production and Operation's active Bolack E No. 4R well pad. The elevation of the proposed access road ranges from approximately 6,600 to 6,780 feet AMSL.

The proposed Lybrook A12 pipeline corridor would parallel the entirety of the proposed access road. From the northwestern terminus of the proposed access road, the pipeline corridor would continue north-northwestward along the edge of the existing access road. The northwestern terminus of the proposed pipeline corridor would be at an existing Enterprise Products (Enterprise) pipeline corridor at the intersection of two existing roads. The portion of the proposed pipeline corridor that follows the existing road would generally follow rolling terrain along the uplands between Gallo and Escrito Canyons. The elevation of the proposed pipeline corridor ranges from approximately 6,600 to 6,900 feet AMSL.

TUA 6 (needed for vehicle staging and pipeline tie construction) would be located at the northwestern terminus of the proposed pipeline corridor. TUAs 2 and 3 (needed for upgrading the existing access road) would be located along the existing access road/proposed pipeline corridor, near the northwestern terminus of the proposed pipeline corridor.

TUA 1 (needed for upgrading an existing access road) would be located approximately 3 miles north of the northwestern terminus of the proposed pipeline corridor. This TUA would be located adjacent to an existing access road near the intersection of the road and County Road (CR) 379. The TUA is located along the steep, rocky eastern slope of Escrito Canyon. The elevation of this TUA ranges from approximately 6,500 to 6,600 feet AMSL.

Numerous ephemeral drainages are found throughout the proposed Lybrook A12 project area.

Lybrook O01

The proposed Lybrook O01 well pad is located approximately 0.4 mile west-northwest of the proposed Lybrook A12 well pad. The proposed Lybrook O01 well pad and surrounding construction zone are located atop even to gently rolling uplands overlooking Gallo Canyon to the east. The elevation within the proposed well pad and construction zone ranges from approximately 6,880 to 6,900 feet AMSL. An old, two-track road travels through the proposed well pad.

The proposed Lybrook O01 access road/pipeline corridor would generally travel northwestward from the proposed well pad to Hugh McMillan's inactive, reclaimed Pipkin No. 2 well pad. From this point, the proposed access road/pipeline corridor would continue north-northeastward along an existing road. The northern terminus of the proposed access road/pipeline corridor would be at the intersection of two existing roads; this is also the northwestern terminus of the proposed Lybrook A12 pipeline corridor and an Enterprise pipeline corridor. Terrain along the proposed access road/pipeline corridor is gently rolling. Elevation ranges from approximately 6,860 to 6,900 feet AMSL.

Several ephemeral drainages are found throughout the proposed Lybrook O01 project area.

Road Closure

The proposed road closure is approximately 0.3 mile north of the northern terminus of the proposed Lybrook O01 access road/pipeline corridor and northwestern terminus of the proposed Lybrook A12 pipeline corridor. The existing road is located on a west-facing slope immediately above an unnamed arm of Escrito Canyon. The road is quite steep, and the terrain is rocky. The elevation ranges from approximately 6,760 to 6,820 feet AMSL. The northeastern terminus of the proposed road closure is at a three-way road intersection; the other two roads associated with this intersection are existing oil and gas roads providing access to oil and gas wells within the uplands between Escrito and Gallo Canyons. The southwestern terminus is at a two-way intersection; the other road associated with this intersection is an existing oil and gas road that provides access from CR 379 to oil and gas wells within the unnamed arm of Escrito Canyon.

2.1.2. Description of Proposed Projects

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

Design Features and Best Management Practices

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

Control of Waste

Liquid and solid wastes would be disposed of at an appropriate waste-disposal site. The proposed project areas would be maintained in a sanitary condition. Hazardous substances would be handled and disposed of according to federal law. A closed-loop system would be used for all three proposed wells; “Pit Rule” guidelines would be followed.

Protection of Paleontological Resources

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

Protection of Cultural Resources

All cultural resource stipulations would be followed as indicated in the Cultural Resource Records of Review, attached to the COAs in the approved APDs or stipulations in the ROW Grants. 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 areas and/or establishment of specific construction avoidance zones, and employee education.

Employees, contractors, and sub-contractors associated with the proposed projects would be informed by 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 Lybrook A12 and Lybrook O01 projects would each disturb more than 4 acres of vegetation, if construction activities associated with either proposed project would occur during the migratory bird breeding season (May 15 through July 31), a migratory bird nest survey of the associated proposed project area would take place one to two days prior to construction. This survey would be conducted by a BLM-FFO-approved biologist following BLM-FFO protocol. If, during the nest survey or during construction, active nests are located within or adjacent to the proposed project area, the BLM-FFO biologist would be notified and project activities would not be permitted until fledging has occurred. If postponement is not an option, the operator would contact the USFWS's Migratory Bird Permit Office regarding permitting.

Should any active raptor nests be observed within one-third mile of the proposed project areas or should any additional SSS (listed by the USFWS or BLM) be observed within the proposed project areas 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 projects 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 projects, they would be netted to prevent birds from entering them.

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 areas. 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 areas 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 projects would be identified and impacts would be mitigated prior to construction. If any fences are damaged during project activities, they would immediately be repaired to their former state or better.

The proposed access road to the Lybrook A12-2306 will cross a BLM grazing allotment boundary. The boundary is considered a natural boundary as it is along a ridge with steep drop-offs and cliffs. A road will likely afford livestock a way across the boundary. The operator will have to install a cattleguard (to be determined immediately after road construction) in the vicinity of TUA#4. The BLM will cooperate and coordinate this effort and will build the wing fences to maintain the integrity of the boundary. The operator will be responsible for the maintenance of the cattleguard.

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

No more than 2,500 feet of proposed pipe trench, or the amount of trench than can be worked on in one day, would be open at any given time. Trenches 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 become trapped.

The ends of proposed pipe trenches 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 trenches; if active livestock grazing is occurring in the proposed project areas, 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 trenches are closed, they 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

A closed-loop system would be used for all three proposed wells; “Pit Rule” guidelines would be followed.

Protection of Topsoil

Topsoil, which would be stripped from the surface of the proposed project areas during the construction phase of the proposed projects, would be stored and protected until it is redistributed during reclamation. Topsoil would be stored 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. Vehicle/equipment traffic would not be allowed to cross topsoil stockpiles.

If the proposed project areas 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 stockpiles so that a crust is created across the exposed soil.

For the proposed pipeline trenches, topsoil would not be used for padding the pipes and would not be mixed with excavated subsoil. Excavated subsoil would be stockpiled separately along the edge of the proposed pipeline corridors. Along the proposed pipeline corridors, 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.

The soil stockpiles and pipe string would also be used as safety barriers during construction of the proposed pipeline ties. If a 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 pipeline corridors 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 areas throughout the life of the proposed projects. 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 Notice to Lessees (NTL) 04-2 FFO (BLM 2004). Encana would adhere to the noise stipulations, if any, included in the COAs attached to the approved APDs.

Additional Design Features and BMPs

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

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

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

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

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 areas and/or when activities would cause irreparable harm to roads, soils, or streams. If equipment creates ruts deeper than six inches, the soil will be deemed too wet for construction or maintenance. No frozen soils would be used for construction purposes or trench backfilling. Encana would use the six-step frozen ground procedure during frozen ground conditions.

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

Table 2. 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

Proposed Project Phases

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

Upgrade of Existing Roads

As part of the proposed Lybrook A12 project, an existing access road near the intersection of CR 379 would be upgraded. The existing road currently travels up a steep hill that has fairly low clearance. The road would be upgraded to standards established by *The Gold Book* (BLM and USFS 2007) and BLM Manual 9113, Sections 1 and 2 (BLM 2011d and BLM 2011e). Because of the steep slope associated with the road, TUA 1 would be used during construction.

An existing access road adjacent to the proposed Lybrook A12 pipeline corridor would be upgraded to standards established by *The Gold Book* (BLM and USFS 2007) and BLM Manual 9113, Sections 1 and 2 (BLM 2011d and BLM 2011e). TUAs 2 and 3 would be used during this road upgrade.

Existing Road Closure

The proposed road closure of the existing, 1,940-foot-long road could occur at any point between the commencement of the proposed projects and the production phase of the proposed wells. During this phase, the flat portion of the existing road, at the northeastern end of the road, would be ripped and re-seeded. The BLM-FFO Sagebrush-Grass Seed Mixture would be used, unless otherwise requested by the BLM-FFO. One to three berms would be installed at each end of the existing road.

Construction of Access Road and Well Pad

The construction phase would be similar for the proposed Lybrook A12 and Lybrook O01 projects. The description below would apply to both projects. Where differences between the projects would exist, these differences are specified at the end of the section.

Access road and well pad construction would take two to three weeks per project. During construction, the following equipment could be utilized onsite:

- Chainsaws
- Brush hog
- Scraper
- Maintainer
- Excavator
- Bulldozer

The proposed access road and 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. Trees 3 inches in diameter or greater (at ground level) would be cut to ground level and delimbed. Tree trunks (left whole) and cut limbs would be placed along the proposed access road, well pad, and/or pipeline corridor in a manner so as to not create additional disturbance or degrade new/existing reclamation, if present. The subsurface portion of the trees (tree stumps and root balls) would be hauled to an approved disposal facility or stockpiled at the edge of the well pad and buried in the cut slopes of the well pad during interim reclamation.

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 access road and 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, such as sandstone for road surfacing, would be needed, Encana would obtain the material from an existing permitted or private source and haul the material by truck.

The well pad construction zone (surrounding the well pad) could be limited in areas if specified by COAs attached to the approved APDs or stipulations attached to the ROW Grants. The size of the proposed well pad is slightly larger than typical well pads in the BLM-FFO area because the equipment (such as tanks) associated with the new hydraulic fracturing design requires a larger area.

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 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(s) associated with the proposed access road is/are 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).

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

Lybrook A12

The proposed access road would be 2,820 feet long. The maximum road grade would be 8 percent. Due to a steep segment within the proposed access road corridor, TUA 4 (adjacent to the proposed access road) would be required during construction. Where the proposed access road crosses a grazing allotment boundary, Encana would install a cattle guard. There is no fence currently in place at this allotment boundary, but one could be installed by the Allottees in the near future.

The proposed well pad would measure 500 feet by 500 feet, including the 50-foot well pad construction zone around the perimeter of the pad. The maximum well pad cut would be 19.4 feet on the southwestern corner (corner 2). The maximum fill would be 14.4 feet on the southeastern corner (corner 6).

TUAs 5 and 6 would be used for vehicle staging during this phase. These TUAs would be brush-hogged prior to use.

Lybrook O01

The proposed access road would be 6,037 feet long; approximately 4,137 feet of this overlaps an existing road. The maximum road grade would be 2 percent.

The proposed well pad would measure 400 feet by 430 feet. A 50-foot well pad construction zone would surround most of the pad; the northeastern portion of the construction zone would be limited due to environmental resources. The maximum well pad cut would be 9.9 feet on the northwestern corner (corner 3). The maximum fill would be 7.3 feet on the eastern side (between corners 5 and 6).

TUA 6, associated with the proposed Lybrook A12-2306, could be used for vehicle staging during this phase.

Drilling and Completion

The drilling and completion phases would be similar for the proposed Lybrook A12 and Lybrook O01 projects. The description below would apply to both projects. Where differences between the projects would exist, these differences are specified at the end of the section.

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
- 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 (NMPM). The New Mexico Office of the State Engineer-assigned permit number for this water well is SJ01979-S4. Water for drilling would be hauled by truck using existing and proposed access roads.

The proposed well(s) would be directionally drilled. Utilizing a fresh water-based drilling mud system, the surface casing 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 wellbore. 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 wellbore. 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 wellbore. 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 wellbore, and reduce downhole fluid losses.

After the wellbore has been drilled to its 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 wellbore and create a pathway for natural gas and oil to travel from the targeted formation to the surface.

Lybrook A12
TUAs 5 and 6 (needed for vehicle staging) could be used during this phase.

Lybrook O01
TUA 6, associated with the proposed Lybrook A12-2306, could be used for vehicle staging during this phase.

<u>Completion</u>
After the production liners have 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 natural gas and oil. 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
- 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 wellbore, under very high pressure, to fracture the targeted formation and release natural gas and oil. During this process, within the horizontal portion of the wellbore, 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 act as a proppant to keep the fractures open and allow natural gas and oil to move more efficiently into the wellbore. 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 natural gas and oil to flow to a wellhead.

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 an existing private water well (SJ01979-S4, described above) and trucked to the location. 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(s) 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 wellbore. This tubing would enhance production by creating a more efficient path for natural gas and oil to travel to the wellhead. At the wellhead, the flow of natural gas and oil would be regulated and controlled by a series of valves and instruments.

Lybrook A12
TUAs 5 and 6 (needed for vehicle staging) could be used during the drilling and completion phases.

Lybrook O01
TUA 6, associated with the proposed Lybrook A12-2306, could be used for vehicle staging during the drilling and completion phases.

Construction of Pipeline Tie

The construction phase would be similar for the proposed Lybrook A12 and Lybrook O01 projects. The description below would apply to both projects. Where differences between the projects would exist, these differences are specified at the end of the section.

If the proposed well(s) associated with the proposed project prove(s) to be productive, a pipeline tie would be constructed and installed to carry natural gas from the well(s) to an Encana pipeline system. The lifetime of a pipeline tie is anticipated to be 30 to 50 years. Pipeline construction would take three to four weeks per project.

The proposed pipeline tie would be up to 6-inch-diameter steel pipe. The proposed pipeline corridor would be 40 feet in width.

The maximum allowable operating pressure of the proposed pipeline tie 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 pipeline corridor.

Site-preparation activities would be limited to the minimum area required for safe and efficient construction.

Vegetation and topsoil would be cleared from within the proposed pipeline corridor. Vegetation- and topsoil-removal activities would be similar to those described in the “Proposed Project Phases - Construction of Access Road and Well Pad” section, above. Topsoil would be stockpiled along the edge of the proposed pipeline corridor.

The trench would be excavated. 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, or a minimum of 48 inches deep at road crossings. Where rock is encountered within the pipeline trench, tractor-mounted mechanical rippers or rock-trenching equipment could be used during excavation activities.

Pipeline tie 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).

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

<u>Lybrook A12</u>
The proposed pipeline corridor would be 5,801 feet long. The corridor would parallel the proposed Lybrook A12 access road and an existing access road. The proposed Lybrook A12 TUAs (for vehicle staging and road construction) could be used during this phase.

<u>Lybrook O01</u>
The proposed pipeline corridor would be 6,089 feet long. The corridor would parallel the proposed Lybrook O01 access road. TUA 6, associated with the proposed Lybrook A12-2306, could be used for vehicle staging during this phase.

Interim Reclamation

The interim reclamation phase would be similar for the proposed Lybrook A12 and Lybrook O01 projects. The descriptions below would apply to both projects. Where differences between the projects would exist, these differences are specified at the end of the section.

If the well(s) associated with the proposed project prove(s) 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 each project’s well pad and access road, and one week for each pipeline corridor. The BLM-FFO would be notified at least 48 hours prior to the start of interim reclamation activities. Interim reclamation could occur simultaneously with production.

During interim reclamation, the following equipment could be utilized onsite:

- Pick-up trucks
- Bulldozer
- Blade

- Farm tractor with disc
- Trackhoe
- Scraper

Areas reclaimed during interim reclamation would include the new surface disturbance associated with the proposed pipeline corridor, the non-driving surface of the proposed access road, the proposed well pad construction zone, and non-working portions of the proposed well pad. Areas that would be reclaimed during this phase are described further in Section 2.1.3 (Proposed Surface Disturbance).

Interim reclamation and subsequent monitoring/reporting is described in the Surface Reclamation Plans (Appendix D).

Lybrook A12
Damage within TUAs would be repaired, and TUAs would be reseeded.

The following water-control features would be installed:

- Two silt traps would be installed within the western portion of the proposed construction zone; one silt trap would be located just south of the northwestern corner (corner 3), and the other silt trap would be located just north of the southwestern corner (corner 2).

- A drainage diversion would be established within the proposed construction zone to carry water from corner 3 to corner 2 and around the southern side of the proposed well pad.

- Additional silt traps and 24- to 36-inch-diameter culverts would be installed within the proposed construction zone and beneath the proposed access road (within the 30-foot-wide corridor) as needed.

Lybrook O01
Silt traps and culverts would be installed within the proposed project area as needed.

Production

The production phase would be similar for the proposed Lybrook A12 and Lybrook O01 projects. The descriptions below would apply to both projects.

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 per project. The proposed access road and the working area 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:

- Wellhead(s)
- Metering units
- Separators
- Aboveground condensate tanks
- Water tanks (tank battery)
- Meter(s)
- VRU compressor(s)
- Pump jack(s) and/or gas skid lift(s), if artificial lift would be required

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 site, 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 placed, to the extent practical, to minimize visual impacts.

Occasionally, work-over or recompletion of the proposed well(s) 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 well(s). Work-over activities could include repairs to the wellbore equipment (e.g., casing, tubing, rods, pump), wellhead(s), or production facilities.

Final Reclamation and Abandonment

The abandonment and final reclamation phase would be similar for the proposed Lybrook A12 and Lybrook O01 projects. The descriptions below would apply to both projects.

If the well(s) associated with the proposed project prove(s) to be unproductive, or when the well(s) is/are no longer commercially viable, the well(s) would be abandoned and final reclamation would take place. The final abandonment phase typically takes two to four weeks per project.

During final reclamation, equipment that could be utilized onsite would be the same as during interim reclamation.

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 bore(s) would be plugged with cement and the production facilities would be removed. An aboveground marker would be placed over the plugged hole(s). The marker(s) would contain individual well identification information.

The underground pipeline tie would typically be plugged and left in place.

If the BLM-FFO does not consider the retention of the proposed well pad and/or access road, as well as existing access road(s) to the location, necessary for the management and multiple uses of natural resources, it/they would be reclaimed. Final reclamation and subsequent monitoring/reporting are described in the Surface Reclamation Plans (Appendix D)

2.1.3. Proposed Surface Disturbance

New surface disturbance associated with the proposed projects would total 25.8 acres. Of this, 3.8 acres would remain disturbed (barren and level) for the life of the proposed projects, at least 17.7 acres would be fully reclaimed during interim reclamation, and a maximum of 4.3 acres would be reseeded (but not fully reclaimed) during interim reclamation. In addition, an approximately 0.3-acre section of an existing road would be reseeded.

Proposed disturbance and reclamation is summarized in the below table. The disturbance and reclamation associated with each proposed project is detailed in the following sections.

Table 3. Surface Disturbance Associated with Proposed Projects

Feature	Total Disturbance (acres)	New Surface Disturbance (acres)	Portion of New Surface Disturbance Reseeded (not fully Reclaimed) during Interim Reclamation (acres) [1]	Portion of New Surface Disturbance Fully Reclaimed during Interim Reclamation (acres)	New Surface Disturbance Remaining Disturbed (Barren and Level) for the Life of Proposed Project (acres) [1]
Lybrook A12					
Access Road	1.9	1.9	-	1.0	0.9
Well Pad & Construction Zone	5.7	5.7	-	4.8	0.9
Pipeline Corridor	5.3	3.3	-	3.3	-
TUA 1	1.1	1.1	1.1[2]	-	-
TUA 2	0.4	0.4	0.4[2]	-	-
TUA 3	0.4	0.4	0.4[2]	-	-
TUA 4	1.5	0.9	0.9[2]	-	-
TUA 5	1.4	1.1	1.1[2]	-	-
TUA 6	0.6	0.4	0.4[2]	-	-
Total	**18.3**	**15.2**	**4.3**[2]	**9.1**[3]	**1.8**
Lybrook O01					
Access Road	4.2	1.3	-	0.7	0.6
Well Pad & Construction Zone	5.9	5.9	-	4.5	1.4
Pipeline Corridor	5.6	3.4	-	3.4	-
Total	**15.7**	**10.6**	**-**	**8.6**	**2.0**
Road Closure					
Existing Road **(Total)**	**-**	**-**	**0.3** [4]	**-**	**-**
Total	**34.0**	**25.8**	**4.6**[2]	**17.7** [3]	**3.8**

[1]This acreage would be fully reclaimed during final reclamation
[2] Some of this acreage could be fully reclaimed (rather than just reseeded) during interim reclamation; therefore, this number represents the potential maximum
[3] Because some of the acreage in the previous column could be fully reclaimed during interim reclamation, this number represents the potential minimum
[4] Estimated

Lybrook A12

The proposed Lybrook A12 project would result in 15.2 acres of new surface disturbance. Of this, a minimum of 9.1 acres would be fully reclaimed during interim reclamation. A maximum of 4.3 acres would be reseeded (but not recontoured) during interim reclamation; it is possible that portions of the acreage included in this figure could be fully reclaimed during interim reclamation. The remainder (1.8 acres) would remain disturbed throughout the life of the project.

- Access Road: The access road would be 2,820 feet long and 30 feet wide (1.9 acres).
    - The 14-foot-wide running surface of the road and the bottoms of the bar ditches alongside the road (approximately 0.9 acre) would remain disturbed for the lifetime of the project. No reclamation would occur within this area during interim reclamation.

- The remainder of the access road corridor (approximately 1.0 acre) would be reclaimed during interim reclamation.

- Well Pad: The well pad would measure 400 by 400 feet (3.7 acres).
  - The 0.9-acre working area (the area routinely used to operate and maintain facilities or improvements) would remain disturbed for the lifetime of the project.
  - The remainder of the well pad (2.8 acres) would be fully reclaimed during interim reclamation.

- Well Pad Construction Zone: A 50-foot-wide (2.0-acre) construction zone would surround the well pad. Less than 0.1 acre would overlap the access road. Therefore, the construction zone would add 2.0 acres of new disturbance to the project area. All new disturbance associated with the construction zone would be fully reclaimed during interim reclamation.

- Pipeline Corridor: The pipeline corridor would be 5,801 feet long and 40 feet wide (5.3 acres). The entire pipeline corridor would parallel the Lybrook A12-2306 No. 01H access road or an existing oil and gas lease road leading to the project area. The pipeline corridor would overlap the roads by 15 feet. Therefore, new surface disturbance would be approximately 3.3 acres. All of this acreage would be fully reclaimed during interim reclamation.

- TUAs: Six TUAs would be used for the project. These TUAs would encompass a total of 5.4 acres. Of this, approximately 1.1 acres would overlap existing disturbance or disturbance associated with other Lybrook A12-2306 project features. Therefore, there would be approximately 4.3 acres of new surface disturbance associated with the TUAs. During interim reclamation, Encana would reseed, but not recontour, most of the TUAs; if possible, Encana would fully reclaim some of the TUAs during this time. During final reclamation, Encana would fully reclaim any TUAs that weren't fully reclaimed during interim reclamation.
  - TUA 1 would be used during the upgrade of an existing road that travels to the project area. This TUA would be approximately 525 feet long, and would range from 75 to 100 feet wide. The TUA would measure 1.1 acres.
  - TUA 2 would be used during the upgrade of an existing road that travels to the project area. This TUA would be approximately 50 feet wide and 314 feet long (0.4 acre).
  - TUA 3 would be used during the upgrade of an existing road that travels to the project area. This TUA would be approximately 45 to 50 feet wide and approximately 330 feet long (0.4 acre).
  - TUA 4 would be used during construction of the Lybrook A12-2306 No. 01H access road. This TUA would be 125 feet wide and approximately 509 feet long (1.5 acres). Approximately 0.6 acre would overlap the Lybrook A12-2306 No. 01H access road and pipeline corridor. Therefore, there would be 0.9 acre of new disturbance associated with this TUA.
  - TUA 5 would be used as a truck staging area. This TUA would be 250 feet by 250 feet (1.4 acres). Approximately 0.3 acre would overlap the Lybrook A12-2306 No. 01H access road and pipeline corridor. Therefore, there would be 1.1 acres of new disturbance associated with this TUA.
  - TUA 6 would be used as a truck staging area and construction workspace during pipeline construction. This TUA would range from 120 to 185 feet long and 100 to 150 feet wide. The TUA would measure 0.6 acre. Approximately 0.2 acre would overlap the Lybrook A12-2306 No. 01H pipeline corridor and/or an existing access road. Therefore, there would be 0.4 acre of new

Lybrook O01

The proposed Lybrook O01 project would result in 10.6 acres of new surface disturbance. Of this, 8.6 acres would be fully reclaimed during interim reclamation. The remainder (2.0 acres) would remain disturbed throughout the life of the project.

- Access Road: The access road would be 6,037 feet long and 30 feet wide (4.2 acres). Approximately 4,137 feet of this length (2.9 acres) overlaps an existing road. The remaining 1,900 feet of the road length (1.3 acres) would be new surface disturbance. Of this new surface disturbance:
    - The 14-foot-wide running surface of the road and the bottoms of the bar ditches alongside the road (approximately 0.6 acre) would remain disturbed for the lifetime of the project. No reclamation would occur within this area during interim reclamation.
    - The remainder of the access road corridor (approximately 0.7 acre) would be reclaimed during interim reclamation.
- Well Pad: The well pad would measure 400 by 430 feet (3.9 acres).
    - The 1.4-acre working area (the area routinely used to operate and maintain facilities or improvements) would remain disturbed for the lifetime of the project.
    - The remainder of the well pad (2.5 acres) would be fully reclaimed during interim reclamation.
- Well Pad Construction Zone: A 50-foot-wide construction zone would surround most of the well pad; this construction zone would be reduced on the northern side by approximately 0.2 acre to avoid sensitive resources. Less than 0.1 acre of the construction zone would overlap the access road. Therefore, the construction zone would add 2.0 acres of new disturbance to the project area. All new disturbance associated with the construction zone would be fully reclaimed during interim reclamation.
- Pipeline Corridor: The pipeline corridor would be 6,089 feet long and 40 feet wide (5.6 acres). Approximately 124 feet of the pipeline corridor length would overlap the Lybrook O01-2306 or Lybrook A12-2306 No. 01H well pads. The remainder of the pipeline corridor length (5,965 feet) would parallel the Lybrook O01-2306 access road. The pipeline corridor would overlap the road by 15 feet. Therefore, new surface disturbance would be approximately 3.4 acres. All of this acreage would be fully reclaimed during interim reclamation.

Road Closure

An existing, 1,940-foot-long road would be closed. A flat, upland portion of this road (estimated at 950 feet long by 14 feet wide, or 0.3 acre) would be reseeded.

2.2. No Action

Under the No Action Alternative, the APDs and ROW Grants would not be approved. The proposed wells would not be drilled and the proposed well pads, access roads, pipeline ties, and TUAs would not be constructed. The existing road would not be closed. Current land and resource uses would continue to occur in the proposed project areas.

2.3. Alternatives Considered but Eliminated from Detailed Study

Natural gas and oil wells can be drilled vertically or directionally/horizontally. Vertical drilling places a well pad directly above the bottom hole, while directional/horizontal drilling allows for flexibility in the placement of the well pad and associated surface facilities. Directional/horizontal drilling often allows for “twinning,” or drilling two or more wells from one shared well pad. Directional/horizontal drilling

applications throughout the San Juan Basin have become relatively routine. Generally, the use of this technology is applied when it is necessary to avoid or minimize impacts to surface resources.

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

For each well pad location, a *SHL Polygon & Feasiblity Map* was created to provide Encana, its surveyors, and its environmental consultants with information that was used in determining the best well pad location based on environmental considerations (topography, hydrology, wildlife habitats, etc), technical limitations associated with horizontal drilling, resource recovery considerations, and correlative rights issues. No alternative surface feature locations were identified for the proposed projects that would result in less surface disturbance than the proposed surface feature locations.

2.3.1. Lybrook A12

A well pad location north of the proposed well pad location was originally considered; this alternative would have shortened the required access road/pipeline corridor and avoided some ephemeral drainages in the southern portion of the proposed well pad. However, this alternative location was considered unfeasible due to the presence of sensitive environmental resources.

Encana considered routing the access road/pipeline corridor to the east, around a particularly steep portion of the currently proposed route. This would have lengthened the proposed access road/pipeline corridor, but would have eliminated the need for TUA 4 and would have eliminated the need to remove a portion of a sandstone outcropping. However, this alternative was considered unfeasible due to the presence of sensitive environmental resources and because a portion of the alternative route would cross through the JAN.

Encana considered several alternative pipeline tie routes. Each of these pipeline routes would have involved a substantial cross-country segment, and would have resulted in a greater amount of new surface disturbance than the proposed pipeline route, so these alternatives were not considered feasible.

Encana considered accessing the proposed well pad from the existing road located 90 feet east of the proposed well pad. However, this alternative was considered unfeasible because this road is likely located on the JAN and is not currently maintained. At least 1.5 miles of this road would need to be upgraded in order for project vehicles to reach the proposed well pad. Additionally, using this road would result in the Lybrook A12 pipeline tie traveling along its current corridor (which would then be cross-country), or paralleling the existing road in discussion (which would require an extensive pipeline tie length in order to reach an appropriate tie-in point).

2.3.2. Lybrook O01

Encana originally considered drilling one well from the proposed Lybrook O01 well pad and drilling the second well from another new well pad located approximately 900 feet to the west of the proposed Lybrook O01 well pad. However, it was later determined that it was technically feasible to drill both wells from the proposed Lybrook O01 well pad; the two-well-pad alternative was therefore dismissed.

Several alternative well pad locations were considered in the immediate vicinity of the proposed well pad. However, due to the presence of numerous sensitive environmental resources in the immediate area, the proposed well pad location was the only feasible configuration.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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

3.1. Air Resources

3.1.1. Affected Environment

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

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

The EPA has the primary responsibility for regulating air quality, including the regulation of six nationally regulated ambient air pollutants (criteria pollutants). These criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} & $PM_{2.5}$), sulfur dioxide (SO_2) and lead (Pb). The EPA has established NAAQS for criteria air pollutants. The NAAQS are protective of human health and the environment. The EPA has approved New Mexico’s State Implementation Plan, and the state enforces state and federal air quality regulations on all public and private lands within the state, with the exception of tribal lands and Bernalillo County.

Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology, and terrain. Air quality also includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. The EPA has proposed or completed actions recently to implement CAA requirements for GHG emissions. Climate has the potential to influence renewable and non-renewable resource management.

Air Quality

Criteria Air Pollutants

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

concentrations" in the analysis area are described below. Design Concentrations are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. Table 4 shows monitored design values for O_3 in recent years for each of the three San Juan County O_3-monitoring stations.

Table 4. Reported Ozone Values for San Juan County Ozone Monitoring Stations

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

Source: NMED 2012
* parts per million

Table 5 summarizes monitored design values for other criteria pollutants in San Juan County.

Table 5. Criteria Pollutant Design Value Concentrations monitored in San Juan County

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

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

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

Hazardous Air Pollutants

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

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

Climate

The analysis area is located in a semiarid climate regime typified by dry, windy conditions and limited rainfall. Summer maximum temperatures are generally in the range of 80 or 90 degrees Fahrenheit (°F), and winter minimum temperatures are generally in the teens to 20s. Temperatures occasionally reach above 100°F in June and July and have dipped below zero in December and January. Precipitation is divided between summer thunderstorms associated with the southwest monsoon and winter snowfall as Pacific weather systems drop south into New Mexico. Table 6 shows climate normals for the 30-year period from 1981 to 2010 for the Farmington, New Mexico, area.

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

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

3.1.2. Impacts from the Proposed Action

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

Direct and Indirect Impacts

Table 7 shows estimated emissions from one proposed horizontal oil well for criteria pollutants, volatile organic compounds (VOCs), and GHGs. For comparison, Table 8 shows total human-caused emissions for each of the counties in the BLM-FFO management area and La Plata County, Colorado, based on the EPA's 2008 emissions inventory (EPA 2011).

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

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

Activity	NOx*	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2
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**
*nitrogen oxide								

Table 8. Analysis Area Emissions in Tons per Year, 2008

County	NO_X	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2
McKinley	12,595.0	31,885.2	37,509.0	66,590.7	6,977.5	1,659.8
Rio Arriba	4,276.6	27,352.9	45,841.5	46,321.6	4,746.2	89.1
San Juan	35,651.7	54,549.5	46,994.9	69,655.7	8,108.3	11,471.0
Sandoval	4,780.1	33,290.5	31,733.6	36,232.3	4,056.3	123.4
Total	**57,303.4**	**147,078.1**	**160,079**	**218,800.3**	**23,897.3**	**13,343.3**
Source: EPA 2008						

Oil storage tanks on the well locations may result in venting of VOCs. Oil well production is generally presented as barrels per day produced. The emissions calculator estimated that for every barrel per day produced there could be 0.12 tons of VOC vented per year. The average horizontal oil well in the BLM-FFO management area produces approximately 100 barrels per day. One hundred barrels per day is estimated to result in 12 tons of VOC emissions per year. Oil storage tanks would be subject to current EPA regulations regarding the capture or flaring of VOC emissions.

Table 9 displays the percent increase in total emissions expected in the analysis area as a result of constructing and operating one horizontal oil well.

Table 9. Percent Increase in Analysis Area Emissions from the Proposed Action

	NO_X	CO	VOC	PM_{10} *	$PM_{2.5}$ *	SO_2 *
Total Emissions	57,303.4	147,078.1	160,079.0	218,800.3	23,897.3	13,343.3
Horizontal Oil Well Emissions	6.13	1.64	12.55(8)	2.54	0.29	0.11
Percent Increase	**0.01**	**0.001**	**0.009**	**0.001**	**0.001**	**0.0008**
*Values derived from average emissions for any well drilling in the analysis area. Calculated results available upon request.						

Hazardous Air Pollutants

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

Total Greenhouse Gases

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

Cumulative Impacts

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

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

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

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

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

3.2. Soil Resources

Soils in the San Juan Basin were formed primarily from two kinds of parent material: alluvial sediment and sedimentary rock. The alluvial sediment is material that was deposited in river valleys and on mesas, plateaus, and ancient river terraces. This material has been mixed and sorted in transport and has a wide range of mineralogy and particle size. The parent material of sedimentary rock consists mainly of sandstone and shale bedrock. These shale and resistant sandstone beds form prominent structural benches, buttes, and mesas bounded by cliffs.

The Natural Resources Conservation Service (NRCS) mapped the soils in the proposed project area. Complete soil information is available in the NRCS's *Soil Survey of Rio Arriba County, New Mexico: Parts of Rio Arriba and Sandoval Counties*. Within the proposed project areas, four soil map units are present (NRCS 2008). These soils are described below.

3.2.1. Orlie fine sandy loam (1- to 8-percent slopes)

Approximately 80 percent of Orlie fine sandy loam (1- to 8-percent slopes) is composed of Orlie and similar soils and 20 percent is made up of minor soil components. The parent material of this soil primarily consists of fan alluvium and/or slope alluvium derived from sandstone and shale. Orlie fine sandy loam soils are considered a well-drained soil, with a depth class of very deep and slowest permeability classification of moderately slow (0.2 to 0.6 inches per hour). Available water capacity for this soil is high (approximately 10.7 inches). This soil type has a shrink swell potential of moderate, runoff classification of medium, and high susceptibility to wind erosion (NRCS 2008).

Orlie fine sandy loam (1- to 8-percent slopes) is typically found along mesa and fan remnant landforms and within loamy ecological sites. The potential plant community for this soil complex is usually comprised of western wheatgrass (*Pascopyrum smithii*), Indian ricegrass (*Achnatherum hymenoides*), needleandthread (*Hesperostipa* sp.), galleta (*Pleuraphis jamesii*), big sagebrush (*Artemisia tridentata*), and fourwing saltbush (*Atriplex canescens*) (NRCS 2008).

3.2.2. Pinavetes-Florita complex (2- to 10-percent slopes)

Approximately 50 percent of Pinavetes-Florita complex (2- to 10-percent slopes) is composed of Pinavetes and similar soils, 40 percent is composed of Florita and similar soils, and 10 percent is made up of minor soil components. The parent material of Pinavetes and Florita soils primarily consists of eolian deposits derived from sandstone. This soil type has a shrink swell potential of low, runoff classification of low, and very high susceptibility to wind erosion. The potential plant community for this soil complex is usually comprised of western wheatgrass, galleta, muttongrass (*Poa fendleriana*), bluestem (*Andropogon* spp.), Indian ricegrass, sand sagebrush (*Artemisia filifolia*), piñon pine (*Pinus edulis*), and oneseed juniper (*Juniperus monosperma*) (NRCS 2008).

Pinavetes soils are considered an excessively drained soil, with a depth class of very deep and slowest permeability classification of rapid (6.0 to 20.0 inches per hour). Available water capacity for Pinavetes soils is low (approximately 3.6 inches). Pinavetes soils are typically found along dune landforms (2- to 10-percent slopes) and within sandy ecological sites (NRCS 2008).

Florita soils are considered a well-drained soil, with a depth class of very deep and slowest permeability classification of moderately rapid (2.0 to 6.0 inches per hour). Available water capacity for Florita soils is moderate (approximately 6.9 inches). Florita soils are typically found along hill landforms (2- to 6-percent slopes) and within loamy ecological sites (NRCS 2008).

3.2.3. Orlie-Nalivag loams, 2- to 8-percent slopes

Approximately 45 percent of this soil unit is composed of Orlie and similar soils, 35 percent is composed of Nalivag and similar soils, and 20 percent is composed of minor components. The parent material of Orlie and Nalivag soils is fan alluvium derived from sandstone and shale.

These soils have a shrink-swell potential of 4.5 percent (moderate), are classified as having medium runoff, have a high (11.2-inch) available water capacity, are very deep, and are considered well drained. These soils are found on loamy uplands. The potential native plant community includes western wheatgrass, big sagebrush, galleta, Indian ricegrass, needleandthread, and fourwing saltbush.

This soil type has a shrink swell potential of low, runoff classification of low, and very high susceptibility to wind erosion. The potential plant community for this soil complex is usually comprised of western wheatgrass, galleta, muttongrass, bluestem, Indian ricegrass, sand sagebrush, piñon pine, and oneseed juniper (NRCS 2008).

Pinavetes soils are considered an excessively drained soil, with a depth class of very deep and slowest permeability classification of rapid (6.0 to 20.0 inches per hour). Available water capacity for Pinavetes soils is low (approximately 3.6 inches). Pinavetes soils are typically found along dune landforms (2- to 10-percent slopes) and within sandy ecological sites (NRCS 2008).

Florita soils are considered a well-drained soil, with a depth class of very deep and slowest permeability classification of moderately rapid (2.0 to 6.0 inches per hour). Available water capacity for Florita soils is moderate (approximately 6.9 inches). Florita soils are typically found along hill landforms (2- to 6-percent slopes) and within loamy ecological sites (NRCS 2008).

3.2.4. Vessilla-Menefee-Orlie complex (1- to 30-percent slopes)

Approximately 45 percent of Vessilla-Menefee-Orlie complex (1- to 30-percent slopes) is composed of Vessilla and similar soils, 25 percent is composed of Menefee and similar soils, 20 percent is composed of Orlie and similar soils, and 10 percent is made up of minor soil components. The potential plant community for this soil complex is usually comprised of western wheatgrass, galleta, Indian ricegrass, needleandthread, blue grama (*Bouteloua gracilis*), big sagebrush, fourwing saltbush, piñon pine, oneseed juniper, and Gambel oak (*Quercus gambellii*) (NRCS 2008).

The parent material of Vessilla soils primarily consists of slope alluvium over residuum weather from sandstone. This soil is considered a well-drained soil, with a depth class of shallow and slowest permeability classification of moderately rapid (2.0 to 6.0 inches per hour). Available water capacity for Vessilla soils is very low (approximately 2.1 inches). This soil type has a shrink swell potential of low, runoff classification of medium, and high susceptibility to wind erosion. Vessilla soils are typically found along break landforms (1- to 30-percent slopes) and within blue grama, piñon pine, oneseed juniper, and Gambel oak ecological sites (NRCS 2008).

The parent material of Menefee soils primarily consists of colluvium over residuum weathered from shale. This soil is considered a well-drained soil, with a depth class of shallow and slowest permeability classification of slow (< 0.1 to 0.2 inches per hour). Available water capacity for Menefee soils is very low (approximately 2.0 inches). This soil type has a shrink swell potential of moderate, runoff classification of high, and susceptibility to wind erosion. Menefee soils are typically found along break landforms (2- to 30-percent slopes) and within blue grama, piñon pine, oneseed juniper, and Gambel oak ecological sites (NRCS 2008).

The parent material of Orlie soils primarily consists of slope alluvium derived from sandstone and shale. This soil is considered a well-drained soil, with a depth class of very deep and slowest permeability classification of moderately slow (0.2 to 0.6 inches per hour). Available water capacity for Orlie soils is high (approximately 10.9 inches). This soil type has a shrink swell potential of moderate, runoff classification of medium, and slight susceptibility to wind erosion. Orlie soils are typically found along summit and mesa landforms (1- to 8-percent).

3.3. Groundwater Resources

3.3.1. Affected Environment

Within a 1-mile radius of the proposed well pads, there is one recorded water well: SJ 681. There is no depth-to-groundwater data available for this water well (New Mexico Office of the State Engineer 2011). Therefore, the depth to groundwater beneath the proposed well pads is unknown.

3.3.2. Impacts from the Proposed Action

Direct and Indirect Impacts

Stimulation (i.e., hydraulic fracturing or “fracking”) is a process used to maximize the extraction of underground resources by allowing oil or natural gas to move more freely from the rock pores to production wells that bring the oil or gas to the surface. Fluids, commonly made up of water (99 percent) and chemical additives (1 percent), are pumped into a geologic formation at high pressure during fracking (EPA 2004). Chemicals added to stimulation fluids may include friction reducers, surfactants, gelling agents, scale inhibitors, acids, corrosion inhibitors, antibacterial agents, and clay stabilizers. When the fracking pressure exceeds the rock strength, the fluids open or enlarge fractures that typically extend several hundred feet away from the well bore, and may occasionally extend up to 1,000 feet from the well

bore. After the fractures are created, a propping agent (usually sand) is pumped into the fractures to keep them from closing when the pumping pressure is released. After fracking is completed, a portion of the injected fracking fluids returns to the wellbore and is recovered for future fracking operations (EPA 2004) or disposal. Stimulation techniques have been used in the U.S. since 1949 and in the San Juan Basin since the 1950s. Over the last 10 years, advances in multi-stage and multi-zone fracking have allowed for the development of gas fields that previously were uneconomic, including the San Juan Basin.

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

Cumulative Impacts

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

3.4. Upland Vegetation

3.4.1. Affected Environment

The proposed project areas are located within the Arizona/New Mexico Plateau ecological region. This ecological region occurs primarily in Arizona, Colorado, and New Mexico; a small portion is located within Nevada. This ecological region encompasses approximately 45,870,500 acres (185,632 square kilometers), and the elevation ranges from 2,165 to 11,949 feet AMSL. The ecological region's landscapes include low mountains, hills, mesas, foothills, irregular plains, alkaline basins, some sand dunes, and wetlands. This ecological region is a large transitional region between the semiarid grasslands to the east; the drier shrublands and woodlands to the north; and the lower, hotter, less-vegetated areas to the west and south. Vegetation communities include shrublands with big sagebrush, rabbitbrush (*Chrysothamnus* spp.), winterfat (*Krascheninnikovia lanata*), shadscale saltbush (*Atriplex confertifolia*), and greasewood (*Sarcobatus vermiculatus*) and grasslands of blue grama, western wheatgrass, green needlegrass (*Nassella viridula*), and needleandthread grass. Higher elevations may support piñon pine (*Pinus edulis*) and juniper (*Juniperus* spp.) woodlands. This ecological region includes the urban areas of Santa Fe and Albuquerque, New Mexico. Important land uses within this ecological region include irrigated farming, recreation, rangeland, wildlife habitat, and some natural gas production (Griffith, et al. 2006).

The proposed project areas are each within piñon-juniper woodland and sagebrush shrubland vegetation communities.

Lybrook A12

The proposed well pad and southeastern portion of the proposed access road/pipeline corridor, which are located within the lowlands of Gallo Canyon, are within a sagebrush shrubland vegetation community. Some upland portions of the proposed access road and pipeline corridor pass through patches of sagebrush shrubland. TUAs 1, 2, 3, 5, and 6 are also located within sagebrush shrubland. Within the proposed project area, this vegetation community has approximately 85 percent ground cover. Dominant species are big sagebrush and blue grama. Additional recorded species include antelope bitterbrush (*Purshia tridentata*), fourwing saltbush, rabbitbrush, Russian thistle (Salsola tragus), broom snakeweed

(*Gutierrezia sarothrae*), buckwheat (*Eriogonum* sp.), rock goldenrod (*Petradoria pumila*), daisy (*Hymenopappus* sp.), sand dropseed (*Sporobolus cryptandrus*), Indian ricegrass, threeawn (*Aristida purpurea*), galleta, and pricklypear (*Opuntia* sp.). There are scattered piñon pine and oneseed juniper trees present.

TUA 4 and portions of the proposed access road and pipeline corridor are located within piñon-juniper woodland. Within the proposed project area, the ground cover within this vegetation community is approximately 15 percent. This woodland is dominated by oneseed juniper and piñon pine trees. Additional recorded species include antelope bitterbrush, big sagebrush, rabbitbrush, broom snakeweed, buckwheat, rock goldenrod, blue grama, and threeawn.

There are 100 to 200 oneseed juniper and piñon pine trees (90 percent mature and 10 percent young) within the proposed project area.

Lybrook O01

The majority of the proposed project area is located within a sagebrush shrubland vegetation community. The species found within this community are similar to those found within the sagebrush shrubland community associated with the proposed Lybrook A12 project area.

The proposed well pad is surrounded by piñon-juniper woodland, and a portion of the proposed access road/pipeline corridor travels through piñon-juniper woodland. The species found within this community are similar to those found within the piñon-juniper woodland community associated with the proposed Lybrook A12 project area.

There are approximately 150 oneseed juniper and piñon pine trees (95 percent mature, 5 percent young) within the proposed project area.

Road Closure

The vegetation community along the edge of the proposed road closure is predominantly piñon-juniper woodland. However, the road itself is barren of vegetation.

3.4.2. Impacts from the Proposed Action

Direct and Indirect Impacts

During the construction phase of the proposed project, 25.8 acres of vegetation within the proposed Lybrook A12 and Lybrook O01 project areas would be cleared. This would include the removal of 250 to 350 trees. During interim reclamation, a maximum of 4.3 acres of these proposed project areas would be reseeded (but not recontoured); approximately 0.3 acre of an existing access road would also be reseeded. During interim reclamation, at least 17.7 acres within the proposed Lybrook A12 and Lybrook O01 project areas would be fully reclaimed. The remaining 3.8 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 Lybrook A12 and Lybrook O01 project areas that were not reclaimed during interim reclamation.

During interim and final reclamation, the BLM Sagebrush-Grass Community Seed Mixture would be utilized. Re-established vegetation would consist of native grass, forb, and shrub species included in the seed mixture, as well as native species that are not deliberately planted. It is also possible that invasive, non-native species could become established within the proposed project areas, as such species could be transported by project equipment and tend to thrive in disturbed areas. Following the reclamation process, the resulting vegetation community could differ from the native plant community surrounding the proposed project areas. 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 pads and access roads, and during wind events could reduce photosynthesis and

productivity of the surrounding vegetation (Thompson, et al. 1984; Hirano, et al. 1995), increase water loss in plants near the proposed project areas (Eveling and Bataille 1984), and result in injury to leaves of surrounding vegetation.

Cumulative Impacts

The spatial analysis area includes the proposed project areas and immediately adjacent lands. The existing and reasonably foreseeable disturbances within this spatial analysis area include the following:

- There is an existing access road at the northwestern terminus of the proposed Lybrook A12 access road. This existing road parallels and partially overlaps the majority of the proposed Lybrook A12 pipeline corridor. TUAs 2, 3, and 6 are located adjacent to this road.
- TUA 1 is located adjacent to another existing road.
- Much of the proposed Lybrook O01 access road/pipeline corridor overlaps an existing road.
- The existing road that is proposed for closure is disturbed and barren of vegetation.
- A two-track road travels through the proposed Lybrook O01 well pad.
- Active wildlife and livestock grazing occurs in the spatial analysis area.

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

3.5. Wildlife

3.5.1. Affected Environment

General Wildlife

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

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 following terrestrial wildlife was identified within the proposed project areas:

- Mule deer (scat, tracks)
- Elk (scat)
- Desert cotton tail *(Sylvilagus auduboni;* scat)
- Wood rat (*Neotoma* sp.; midden)
- Coyote (*Canis latrans;* tracks)
- Black-tailed jackrabbit (*Lepus californicus*)

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 EO 13186, and to better optimize migratory bird efforts related to BLM-FFO activities (BLM 2010). In keeping with this policy, a list of priority birds of conservation concern which occur in eco-regions similar to the proposed project areas was compiled through a review of existing bird conservation plans, including the following:

- USFWS Birds of Conservation Concern
- New Mexico Partners in Flight (NMPIF) 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 and a brief assessment of their habitat are identified in the below table.

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

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

The following birds were identified during the surveys of the proposed project areas:

- Red-tailed hawk (Buteo jamaicensis)
- Common raven (*Corvus corax*)

- Piñon jay (Gymnorhinus cyanocephalus)
- Mountain chickadee (Poecile gambeli)
- Mountain bluebird (Sialia currucoides)
- Townsend's solitaire (Myadestes townsendi)
- Juniper titmouse (Baeolophus ridgwayi)

3.5.2. Impacts from the Proposed Action

Direct and Indirect Impacts

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

Approximately 25.8 acres of sagebrush shrubland and piñon-juniper woodland, including 250 to 350 trees, would be cleared during the construction phases of the proposed projects. Approximately 3.8 acres would remain barren of vegetation for the long term. Reclaimed portions of the proposed project areas would be converted to a reseed community following interim reclamation and final reclamation. The impacts to the vegetation communities are described in detail in Section 3.4 (Upland Vegetation). If interim and final reclamation are successful, a sagebrush shrubland or piñon-juniper community would become re-established within the proposed project areas. 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 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 4,720 linear feet of new habitat fragmentation resulting from the proposed project. This habitat fragmentation would result from the proposed Lybrook A12 access road (2,820 feet long) and proposed Lybrook O01 access road (1,900 of new road length). The proposed pipeline corridors would parallel proposed or existing roads, so would not create new habitat fragmentation. Conversely, the reseeding of 950 feet of an existing access road would reduce habitat fragmentation within a portion of the proposed project area.

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

General Wildlife

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

During the construction phase of the proposed pipeline ties, terrestrial wildlife could fall into the open pipeline trenches and be injured, stressed, or killed. The presence of open trenches 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 pipeline corridors to access water and/or food. This disruption could stress wildlife and result in the loss of valuable energy resources. As discussed in Section 2.1.2 (Description of Proposed Project – Design Features and Best Management Practices - Protection of Flora and Fauna, Including SSS and Livestock), design features and BMPs would be implemented during the construction phase of the proposed pipeline ties 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 projects. Due to pre-construction migratory bird nest surveys (described in Section 2.1.2 [Description of Proposed Projects – Design Features and Best Management Practices – Protection of Flora and Fauna, Including SSS and Livestock), it is unlikely that nests, eggs, or young birds would be directly harmed by the proposed projects. Birds nesting outside of but near the proposed project areas could abandon existing nests as a result of visual and audial disturbances.

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

Cumulative Impacts

The spatial analysis area for wildlife includes the proposed well pads, access roads, and pipeline corridors and an approximately 2-mile radius around these areas. 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:

- 31 active oil and/or gas wells and associated well pads
- 20 inactive oil and/or gas wells and associated well pads (some reclaimed)
- 1 proposed oil and/or gas well pad
- Approximately 4 miles of New Mexico State Highway 403
- Approximately 4 mile of County Roads (including County Roads 379 and 498)
- Approximately 26 miles of BLM roads
- Approximately 1 mile of proposed oil and gas roads
- Numerous existing and proposed utility corridors, most of which parallel existing or proposed roads
- Active wildlife and livestock grazing

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

3.6. Special Status Species

3.6.1. Affected Environment

The BLM manages certain species which are not federally listed as threatened or endangered in order to prevent or reduce the need to list them as threatened or endangered in the future. BLM SSS include BLM Sensitive Species and BLM-FFO Special Management Species (SMS).

New Mexico BLM State Directors have developed a list of BLM Sensitive Species for the State of New Mexico (BLM 2011a, BLM 2011b, BLM 2011c, BLM 2012a). In accordance with BLM Manual 6840, the BLM-FFO has prepared a list of BLM-FFO SMS to focus species management efforts toward maintaining habitats under a multiple-use mandate (BLM 2008a, BLM 2008c). BLM-FFO SMS include some BLM Sensitive Species and other species for which the BLM-FFO has determined special management is appropriate (BLM 2008c). The authority for this policy and guidance is established by the ESA; Title II of

the Sikes Act, as amended (16 USC 670a-670o, 74 Stat. 1052); FLPMA; and Department of Interior Manual 235.1.1A.

Based on known range and habitat, several BLM Special Status Species have the potential to occur within the proposed project areas. These species, their habitat descriptions, and their potential to occur within the proposed project areas are listed in the below table.

Table 11. BLM Special Status Species with Potential to Occur within Proposed Project Areas

Species	Status	Documented Occurrence Within BLM-FFO Region	Habitat
American peregrine falcon (*Falco peregrinus anatum*)	SMS	Summer/ breeding range (Sibley 2000). Known to nest in BLM-FFO (BLM 2003a).	Rugged, semi-open to wooded areas in montane regions. Areas with rocky cliffs, outcrops, and canyons that are at least 30 feet high and often near water. In New Mexico, typically nests on cliff ledges (NMPIF 2007, Wheeler 2003).
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).
Ferruginous hawk (*Buteo regalis*)	SMS	Year-round range (NMPIF 2007). Known to nest in BLM-FFO (BLM 2012b).	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).
Golden eagle (*Aquila chrysaetos*)	SMS	Year-round range (Sibley 2000). Known to nest in BLM-FFO (BLM 2012b).	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).
Piñon jay (*Gymnorhinus cyanocephalus*)	Sensitive	Year-round range (Sibley 2000). Known to occur within BLM-FFO (BLM 2011a).	Piñon-juniper woodlands. Occasionally areas dominated by ponderosa pine, sagebrush, or chapparal (NMPIF 2007).
Spotted bat (*Euderma maculatum*)	Sensitive	Known to occur within BLM-FFO (BLM 2011b).	Ponderosa pine forests, piñon-juniper woodlands adjacent to sandstone cliffs, open semi-desert shrublands. Often over streams or water holes in ponderosa or mixed conifer forests. Roost in cracks and crevices of canyons and cliffs (BLM 2011b).
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).

There are no recorded raptor Special Status Species nests within 0.3 mile of the proposed project areas (BLM 2012b). Species are described in detail below.

American Peregrine Falcon

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

The open sagebrush shrubland and piñon-juniper woodland vegetation communities within the proposed project areas could potentially provide foraging habitat for this species. However, no nesting habitat is provided in the immediate vicinity. The nearest recorded peregrine falcon nest is approximately 14 miles northwest of the proposed project areas. No evidence of this species was observed during the surveys of the proposed project areas.

Bendire's Thrasher

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

Within the proposed project areas, the sagebrush shrublands and open portions of the piñon-juniper woodlands could be used by this species for foraging and nesting. No Bendire's thrashers were identified during the surveys of the proposed project areas.

Ferruginous Hawk

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

The sagebrush shrublands and piñon-juniper woodland edges within the proposed project areas could provide potential foraging habitat for this species. No nesting habitat is provided within the immediate vicinity. The nearest recorded ferruginous hawk nest is approximately 29 miles west-southwest of the proposed project area. No evidence of this species was observed during the surveys of the proposed project areas.

Golden Eagle

Golden eagles may be found in the BLM-FFO region year-round. These raptors occur in open to semi-open country, including open wooded areas, grasslands, shrublands, or barren areas. They prefer hilly or mountainous areas with elevated perches (NMPIF 2007, NatureServe 2012, and Wheeler 2003). Golden

eagles may also be found in areas with light agricultural use, but rarely inhabit rural areas. During the breeding season, these eagles are primarily found in areas with mountain cliffs or canyons (NMPIF 2007). Nesting habitat for golden eagles consists of embankments or cliffs and/or flat to moderate areas with scattered large trees (Wheeler 2003). Dense forests are avoided for nesting. In New Mexico, most nests are within steep-walled mountain canyons (NMPIF 2007). During the summer, golden eagles may be found above timberline. During the winter, they are typically found below timberline and may forage in moderate agricultural areas (Wheeler 2003).

Within the proposed project areas, the sagebrush shrublands and open portions of the piñon-juniper woodlands could be used by this species for foraging. No nesting habitat is provided within the immediate vicinity. The nearest recorded golden eagle nest is approximately 4 miles north of the proposed well pads; this nest is located approximately 0.7 mile north of the proposed road closure. No evidence of this species was observed during the surveys of the proposed project areas.

Piñon Jay

Piñon jays may occur in the BLM-FFO region year-round, with a preference for the foothill regions of New Mexico. This bird species inhabits piñon-juniper woodlands and has a strong association with piñon pine (*Pinus edulis*) trees. Piñon jays also have the potential to occur in areas dominated by Ponderosa pine (*Pinus ponderosa*), sagebrush, or chaparral vegetation. During the piñon jay summer breeding season (mid-February through late summer/fall), this bird species is highly social and breeds in large breeding colonies. The colonial nesting sites are typically located in dense, mature stands of piñon-juniper woodlands (NMPIF 2007).

The piñon-juniper woodlands within the proposed project areas could be used by piñon jays for foraging and nesting. Piñon jays were observed within the proposed Lybrook A12 project area during the survey.

Spotted Bat

Spotted bats are a permanent resident in the BLM-FFO area. This bat species inhabits various habitat types, including deserts, open Ponderosa pine forests, piñon-juniper woodlands, canyon bottoms, open pastures, and hayfields. Roosting habitat for spotted bats consists of caves, cracks, and crevices along canyon or cliff walls (NatureServe 2012).

The sagebrush shrublands and piñon-juniper woodlands within the proposed project areas provide potential foraging habitat for this species. Roosting habitat is not provided within the proposed project areas. Surveys of the proposed project areas were diurnal; no bats were observed.

Townsend’s Big-Eared Bat

Townsend’s big-eared bats occur in desert scrub, desert mountain, oak-woodland, piñon-juniper woodland, and coniferous forest habitats. This species roosts mostly in caves, mines, or abandoned buildings (BLM 2011b).

The sagebrush shrublands and piñon-juniper woodlands within the proposed project areas provide potential foraging habitat for this species. Roosting habitat is not provided within the proposed project areas. Surveys of the proposed project areas were diurnal; no bats were observed.

3.6.2. Impacts from the Proposed Action

Direct and Indirect Impacts

American Peregrine Falcon, Ferruginous Hawk, and Golden Eagle

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

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 projects 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).

Bendire's Thrasher and Piñon Jay

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

Spotted Bat and Townsend's Big-Eared Bat

Due to the lack of roosting sites within the proposed project areas and the fact that project construction would occur during the day (while these species are roosting), it is unlikely that these bats would be directly harmed by the proposed projects.

The clearing of vegetation could result in the removal of foraging habitat and the creation of habitat fragmentation for bats. In addition, audial and visual disturbances associated with the proposed projects 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).

Cumulative Impacts

The spatial analysis area for wildlife SSS includes the proposed well pads, access roads, and pipeline corridors and an approximately 2-mile radius around these areas. Within the spatial analysis area, there is existing disturbance. 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 pipeline corridors).

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

3.7. Cultural Resources

3.7.1. Affected Environment

The proposed project areas are located within the archaeologically rich San Juan Basin of northwestern New Mexico. In general, the history of the San Juan Basin can be divided into five major periods: PaleoIndian (circa [ca.] 10,000 B.C. to 5,500 B.C.); Archaic (ca. 5,500 B.C. to A.D. 400); Basketmaker II-III and Pueblo I-IV (aka Anasazi; A.D. 1-1,540); and historic (A.D. 1,540 to present), which includes Native American as well as later Hispanic and Euro-American settlers. Detailed descriptions of these various periods are provided in the BLM-FFO PRMP/FEIS (BLM 2003a, 3-65 – 3-84) and will not be reiterated here. Additional information can also be found in an associated documented, the Cultural Resources Technical Report (Science Applications International Corporation 2002).

Cultural sites vary considerably, and can include but are not limited to simple artifact scatters, domiciles of various types with a myriad of associated features, rock art and inscriptions, ceremonial/religious features, and roads and trails.

The entire Area of Potential Effect (APE) for each proposed project was archaeologically surveyed by LAC 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).

Lybrook A12

The archaeological report for the proposed Lybrook A12 project is LAC Report No. 2013-7jj (2013a, BLM Report No. 2014(II)029F). During the Class III inventory, 26 cultural sites were encountered within the APE.

Sixteen of these sites are recommended as eligible for nomination to the NRHP, and further data is needed for five sites before a determination can be made (LAC 2013a). No TCPs are known to exist in the APE.

Lybrook O01

The archaeological report for the proposed Lybrook O01 project is LAC Report No. 2013-7w (2013b, BLM Report No. 2014(II)021F). During the Class III inventory, 16 cultural sites were encountered within the APE. Fourteen of these sites are recommended as eligible for nomination to the NRHP, and further data is needed for one site before a determination can be made (LAC 2013b). No TCPs are known to exist in the APE.

3.7.2. Impacts from the Proposed Action

Direct and Indirect Impacts

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

Significant cultural sites (e.g., sites eligible for the NRHP) would be avoided with the implementation of design features such as, but not limited to, reduction of construction areas, installation of temporary barriers, and site monitoring. These design features are detailed in the Cultural Resource Record of Review, attached to the COAs in the approved APDs and stipulations attached to the ROW Grants. The proposed action would not be expected to physically threaten any TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere with or otherwise hinder the performance of traditional ceremonies/rituals. The proposed action would have no direct or indirect impact on significant cultural sites.

Cumulative Impacts

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

3.8. Transportation and Travel Management

3.8.1. Affected Environment

The existing, approximately 1,940-foot-long road, which would be closed as part of the proposed project, is a fairly steep “shortcut” between a lowland arm of Escrito Canyon and uplands to the east of Escrito Canyon. This road is used by oil and gas personnel. Based on topography and sharp turns associated with this road, it is unlikely that it could be used to haul large equipment. It is also unlikely that this road could be upgraded and widened for equipment hauling, as the road is located on a sideslope.

The road at the southwestern end of the shortcut is an oil and gas road that provides access from CR 379 to several active oil and/or gas wells within an unnamed arm of Escrito Canyon. The road at the northeastern end of the shortcut is an oil and gas road that provides access to numerous active oil and/or gas wells on uplands between Escrito and Gallo Canyons. This upland road connects to CR 379 approximately 2.3 miles to the north. Aside from being connected by the aforementioned shortcut, these two roads are also connected by a second, unmaintained shortcut, approximately 0.3 mile to the south.

3.8.2. Impacts from the Proposed Action

Direct and Indirect Impacts

If the existing road is closed, oil and gas personnel would no longer be able to utilize the shortcut between the Escrito Canyon arm and the uplands to the east of Escrito Canyon. Instead, they would be

required to access the uplands via an existing access road off of CR 379; this intersection is approximately 2.3 miles to the north. Alternatively, another existing, unmaintained shortcut, connecting the Escrito Canyon arm and the uplands, is present approximately 0.3 mile to the south.

Cumulative Impacts

There are numerous oil and gas access roads in the vicinity of the proposed road closure site, some of which provide alternate routes between one another. Numerous proposed wells and associated access roads (including the proposed Lybrook A12 and Lybrook O01 roads) are being proposed in the region. Although the proposed road closure project would result in a reduction of existing roads by 1,940 feet, there would be a net increase in the length of regional roads as a result of the proposed Lybrook A12, Lybrook O01, and other reasonably foreseeable future access roads in the area.

3.9. Livestock

3.9.1. Affected Environment

The proposed project areas are located within two grazing allotments. These allotments are described below. Within the proposed project areas, there are currently no fences located between these allotments. There are no other range improvements within or adjacent to the proposed project areas.

Gallo (Allotment No. 5124)

The proposed Lybrook A12 well pad/construction zone and an approximately 1,125-foot-long section of the proposed Lybrook A12 access road/pipeline corridor are within the Gallo Allotment. These features encompass approximately 3.3 acres.

The vegetation communities within the allotment are primarily sagebrush shrubland and piñon-juniper woodland. The allotment has a grazing authorization that permits 13 head of cattle with a year-round grazing period. The term grazing authorization permits the utilization of 115 active Animal Unit Months (AUMs) of forage. An AUM is the amount of forage needed to sustain a cow (1000-pound) or cow/calf pair for one month. The allotment is 2,797 acres and consists of 74-percent BLM-authorized AUMs. The average rangeland carrying capacity for the allotment is 24.3 acres per AUM.

Rancho Largo (Allotment No. 5119)

The proposed Lybrook O01 project area and the majority of the proposed Lybrook A12 project area are within the Rancho Largo Allotment. These features encompass approximately 22.5 acres. The proposed road closure is also located within the Rancho Largo Allotment.

The vegetation communities within the allotment are primarily sagebrush shrubland and piñon-juniper woodland. The allotment has a grazing authorization that permits 300 head of cattle with a June 1-to-December 31 grazing period. The term grazing authorization permits the utilization of 1,752 active AUMs of forage. The allotment is 90,561 acres and consists of 83-percent BLM-authorized AUMs. The average rangeland carrying capacity for the allotment is 51.7 acres per AUM.

3.9.2. Impacts from the Proposed Action

Direct and Indirect Impacts

The proposed projects would result in 3.3 acres of new surface disturbance and 1.3 acres of long-term barren surface within the Gallo Allotment. The proposed projects would result in 22.5 acres of new surface disturbance and 2.5 acres of long-term barren surface within the Rancho Largo Allotment. The estimated short-term impact to range carrying capacity would be a loss of 0.5 AUM. This would include a loss of 0.1 AUM within the Gallo Allotment (assuming an average rangeland carrying capacity of 24.3 acres per AUM) and 0.4 AUM within the Rancho Largo Allotment (assuming an average rangeland

carrying capacity of 51.7 acres per AUM). After successful interim reclamation, the long-term-loss would be less than 0.2 AUM (less than 0.1 AUM within each allotment). As a result of the reseeding of approximately 0.3 acre within the proposed road closure, less than 0.1 AUM would be returned to the Rancho Largo Allotment for the long term.

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 could 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. Mitigation associated with the protection of livestock during pipeline trenching is discussed in detail in Section 2.1.2 (Description of Proposed Projects – Design Features and Best Management Practices - Protection of Flora and Fauna, including SSS and Livestock).

No fences would be cut. Under the proposed project, a cattle guard would be installed along the proposed Lybrook A12 access road, where the road crosses the boundary between the allotments. There is not currently a fence along this boundary; this cattle guard would be installed in the event that a fence is installed in the future.

Cumulative Impacts

The spatial analysis area for livestock is the Gallo and Ranch Largo Allotments. Within these allotments, there are numerous active, inactive, and proposed well pads and associated access roads and utility corridors. There are also county roads and scattered rural development.

The proposed projects would contribute to cumulative disturbance within the allotments.

4. SUPPORTING INFORMATION

4.1. Tribes, Individuals, Organizations, or Agencies Consulted

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

- Brenda Linster, Encana
- Jason Eckman, Encana
- Fred Harden, LAC
- Leslie Sesler, LAC
- Greg Horezak, LAC

4.2. List of Preparers

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

- Jenny Holmen, Senior Environmental Scientist, NCI
- Catherine Roy, Environmental Scientist, NCI
- Amanda Nisula, Planning and Environmental Specialist, BLM-FFO
- Barney Wegener, Natural Resources Specialist, BLM-FFO
- Sheila Williams, District Botanist, BLM-FFO
- John Hansen, Wildlife Biologist, BLM-FFO

- John Kendall, Wildlife Management Biologist, BLM-FFO
- Jim Copeland, Archaeologist, BLM-FFO
- Jeff Tafoya, Range Specialist, BLM-FFO
- Roger Herrera, Environmental Protection Specialist, BLM-FFO

4.3. References

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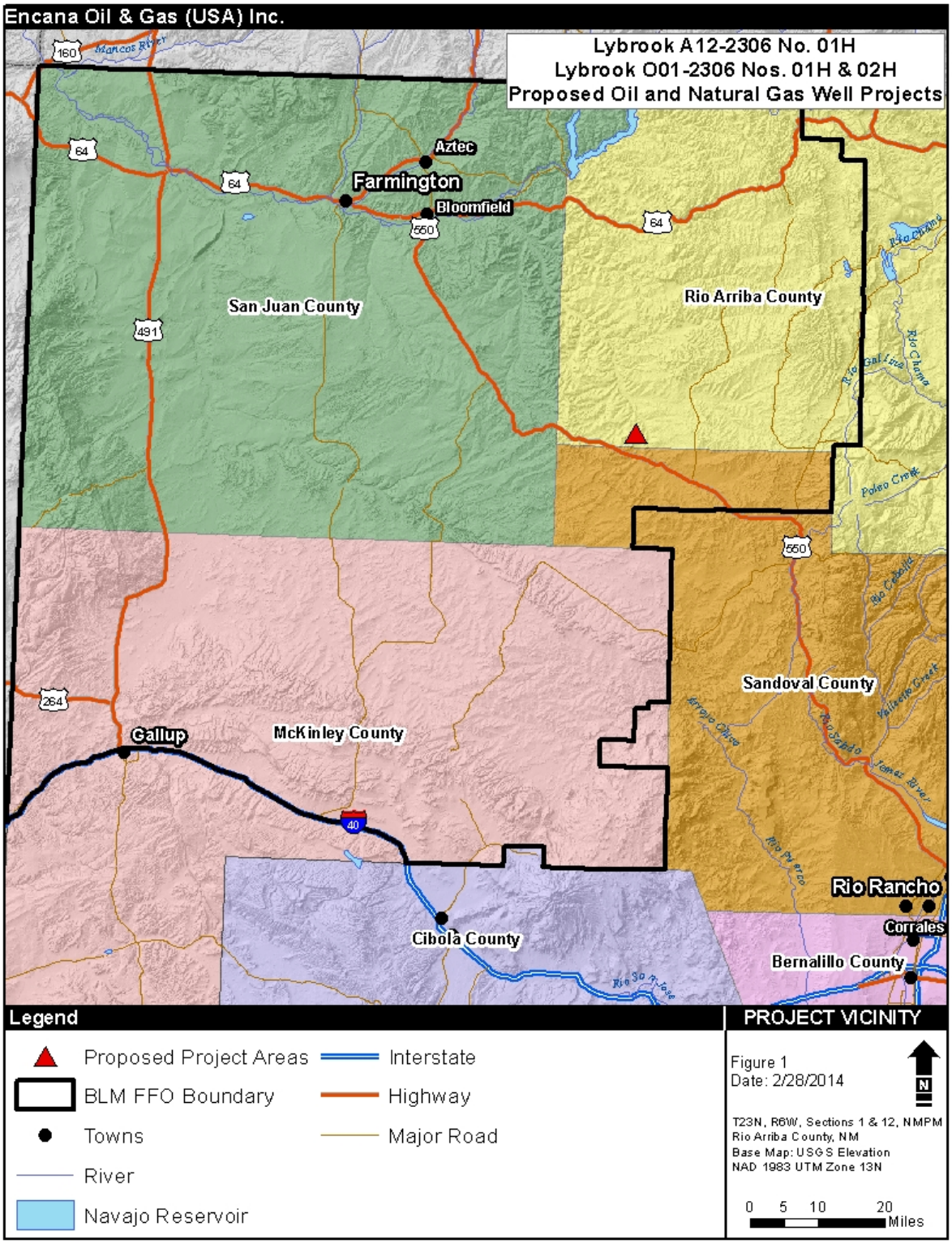
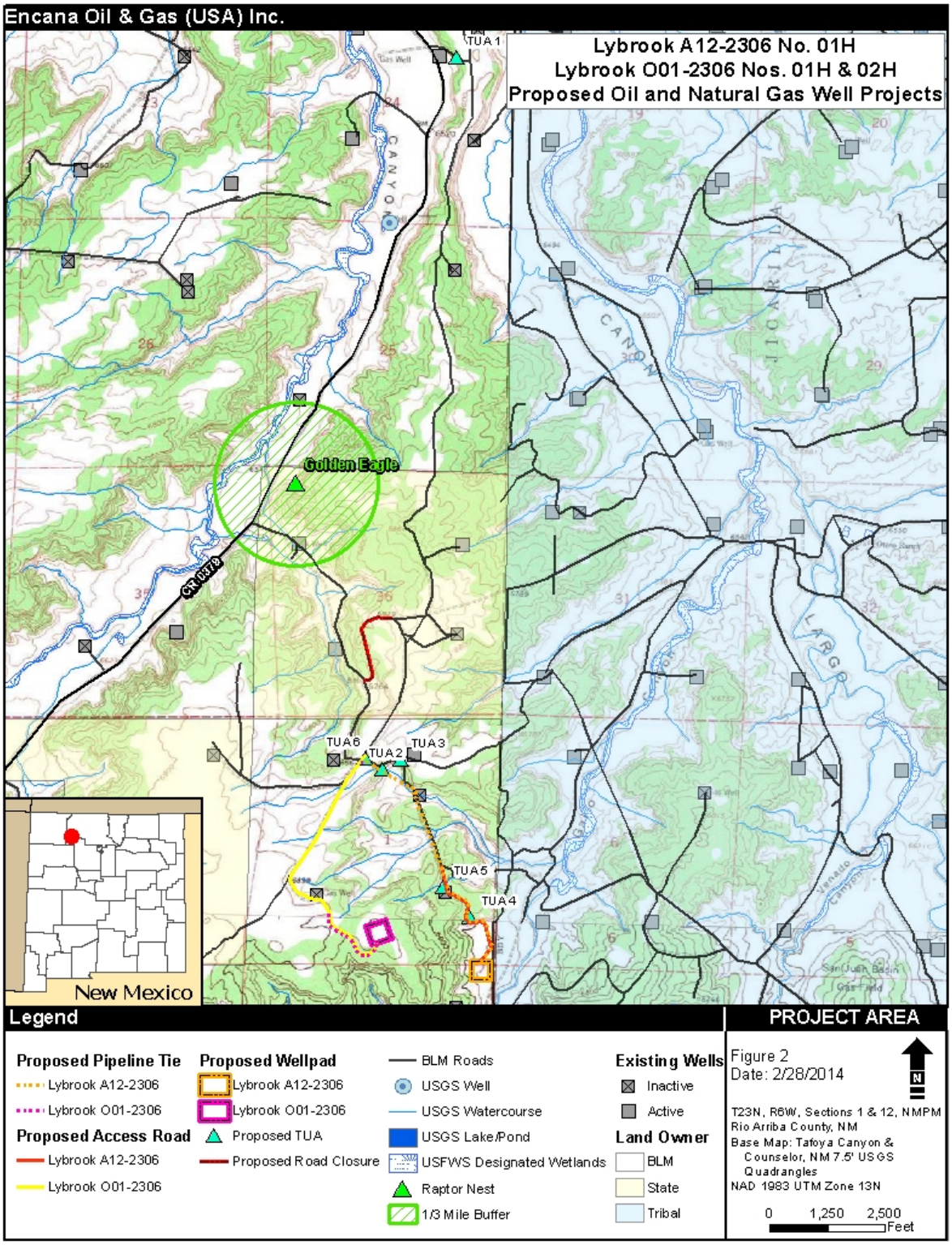
APPENDIX A. MAPS

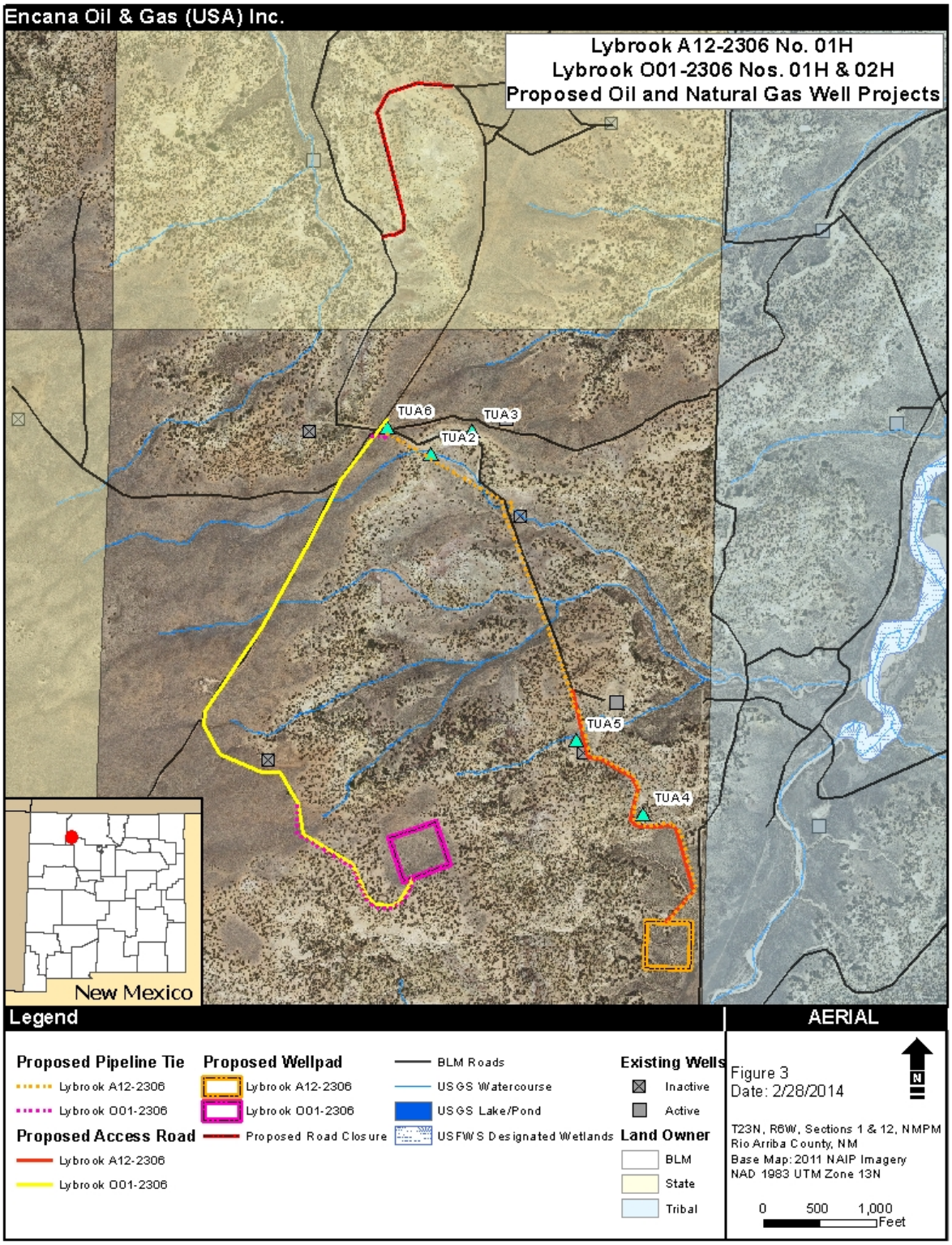
A.1. Vicinity Map



A.2. Project Area Map



A.3. Aerial Map



APPENDIX B. PLATS

B.1. Lybrook A12

DISTRICT I
1625 N. French Dr., Hobbs, N.M. 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
DISTRICT II
811 S. First St., Artesia, N.M. 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
DISTRICT III
1000 Rio Brazos Rd., Aztec, N.M. 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
	13379	COUNSELORS GALLUP / DAKOTA

[4] Property Code	[5] Property Name	[6] Well Number
	LYBROOK A12-2306	01H

[7] OGRID No.	[8] Operator Name	[9] Elevation
282327	ENCANA OIL & GAS (USA) INC.	6693.0'

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	WEST/West line	County
A	12	23N	6W		81'	NORTH	264'	EAST	RIO ARRIBA

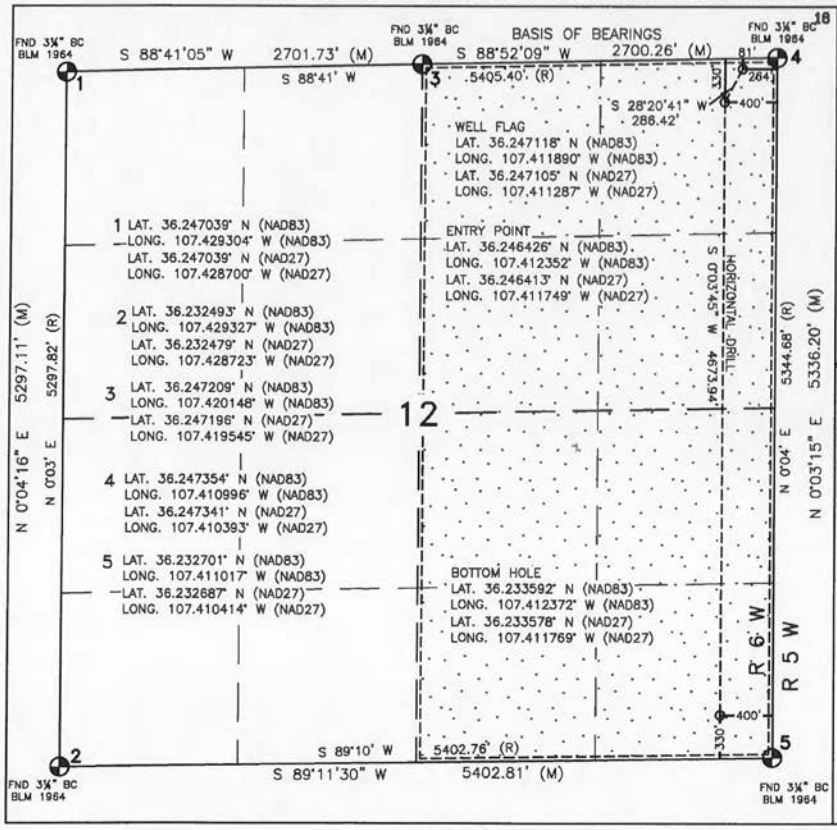
[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	WEST/West line	County
P	12	23N	6W		330'	SOUTH	400'	EAST	RIO ARRIBA

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
PROJECT AREA 320.00 ACRES E/2 SEC. 12			

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



[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

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.

OCTOBER 29, 2013
Date of Survey

Signature and Seal of Professional Surveyor

DAVID RUSSELL
NEW MEXICO
10201
REGISTERED PROFESSIONAL LAND SURVEYOR

DAVID RUSSELL
Certificate Number 10201

WELL FLAG
LATITUDE: 36.247118° N
LONGITUDE: 107.411890° W
DATUM: NAD83

ENCANA OIL & GAS (USA) INC.

LYBROOK A12-2306 #01H
81' FNL & 264' FEL
LOCATED IN THE NE/4 NE/4 OF SECTION 12,
T23N, R6W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO
GROUND ELEVATION: 6690.8', NAVD 88
FINISHED PAD ELEVATION: 6693.0', NAVD 88

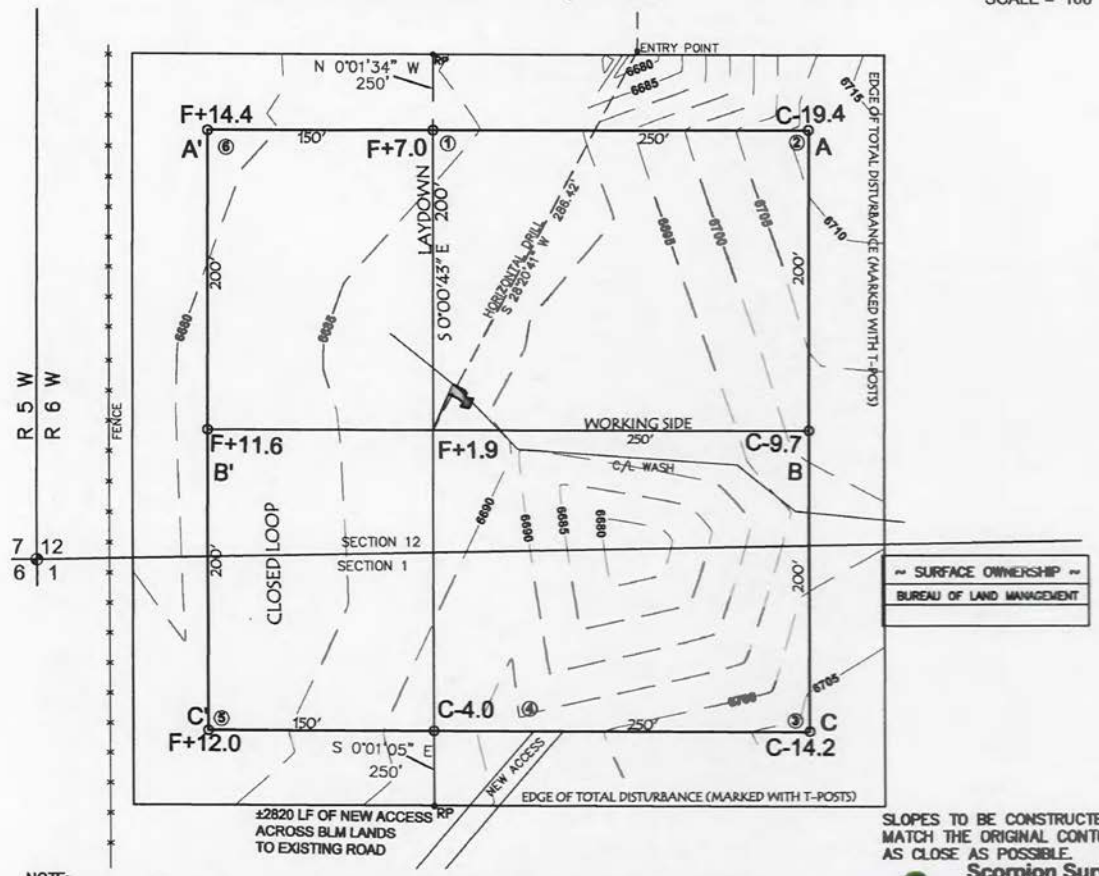
NOTES:

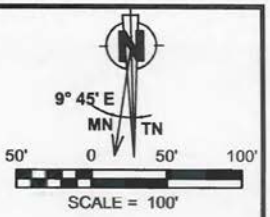
1.) BASIS OF BEARING: BETWEEN FOUND MONUMENTS AT THE NORTHEAST CORNER AND THE NORTH QUARTER CORNER OF SECTION 12, TOWNSHIP 23 NORTH, RANGE 6 WEST, N.M.P.M. RIO ARRIBA COUNTY, NEW MEXICO.
LINE BEARS: S 88°52'09" W A DISTANCE OF 2700.26 FEET AS MEASURED BY G.P.S.

2.) LATITUDE, LONGITUDE AND ELLIPSOIDAL HEIGHT BASED ON AZTEC CORS L1 PHASE CENTER.
DISTANCES SHOWN ARE GROUND DISTANCES USING A TRAVERSE MERCATOR PROJECTION FROM A WGS84 ELLIPSOID, CONVERTED TO NAD83.
NAVD88 ELEVATIONS AS PREDICTED BY GEOID03.

3.) LOCATION OF UNDERGROUND UTILITIES DEPICTED ARE APPROXIMATE. PRIOR TO EXCAVATION UNDERGROUND UTILITIES SHOULD BE FIELD VERIFIED. ALL CONSTRUCTION ACTIVITIES SHOULD BE FIELD VERIFIED WITH NEW MEXICO ONE-CALL AUTHORITIES AT LWEST 48 HOURS PRIOR TO CONSTRUCTION.

4.) T-POSTS HAVE BEEN SET TO DEFINE THE EDGE OF DISTURBANCE LIMITS WHICH ARE 50' OFFSETS FROM THE EDGE OF THE STAKED WELL PAD.





SLOPES TO BE CONSTRUCTED TO MATCH THE ORIGINAL CONTOURS AS CLOSE AS POSSIBLE.

TOTAL PERMITTED AREA
500' x 500' = 5.74 ACRES
SCALE: 1" = 100'
JOB No.: ENC090_REV2
DATE: 11/22/13
DRAWN BY: TWT

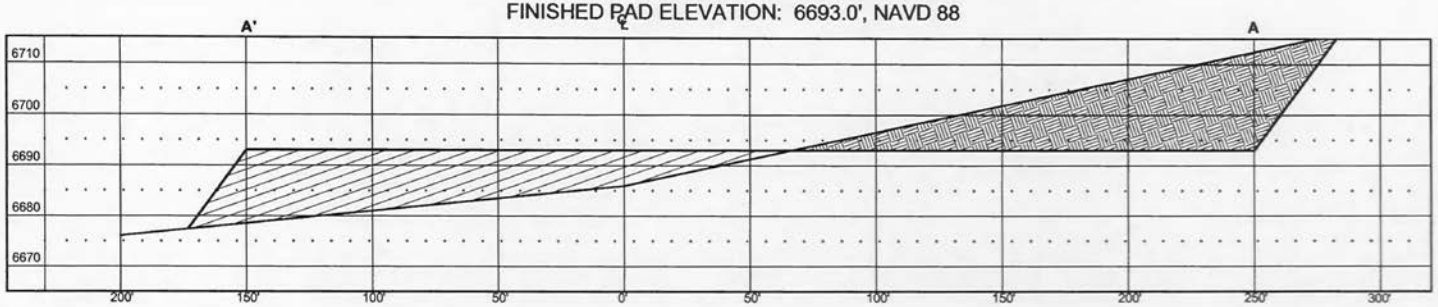
NOTE:
SCORPION SURVEY & CONSULTING, L.L.C. IS NOT LIABLE FOR UNDERGROUND UTILITIES OR PIPELINES. CONTRACTOR SHOULD CALL ONE-CALL FOR LOCATION OF ANY MARKED OR UNMARKED, BURIED PIPELINES OR CABLES ON WELL PAD, IN CONSTRUCTION ZONE AND/OR ACCESS ROAD AT LWEST TWO (2) WORKING DAYS PRIOR TO CONSTRUCTION.

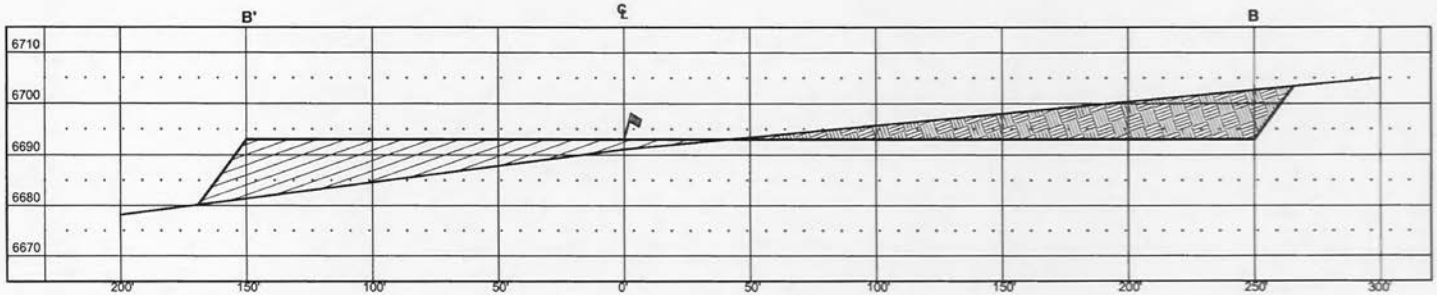
Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

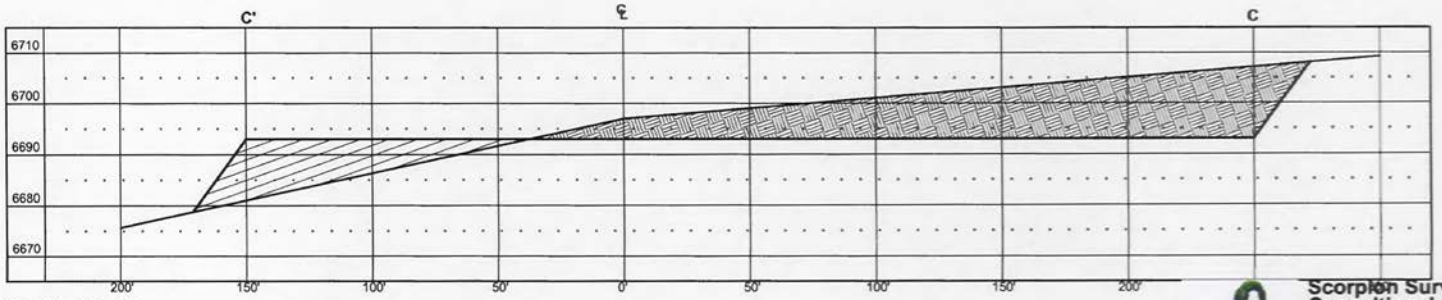
LATITUDE: 36.247118° N
LONGITUDE: 107.411890° W
DATUM: NAD 83

ENCANA OIL & GAS (USA) INC.

LYBROOK A12-2306 #01H
81' FNL & 264' FEL
LOCATED IN THE NE/4 NE/4 OF SECTION 12, T23N, R6W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO
GROUND ELEVATION: 6690.8', NAVD 88
FINISHED PAD ELEVATION: 6693.0', NAVD 88







VERT. SCALE: 1" = 30'
HORZ. SCALE: 1" = 60'
JOB No.: ENC090_REV2
DATE: 11/22/13

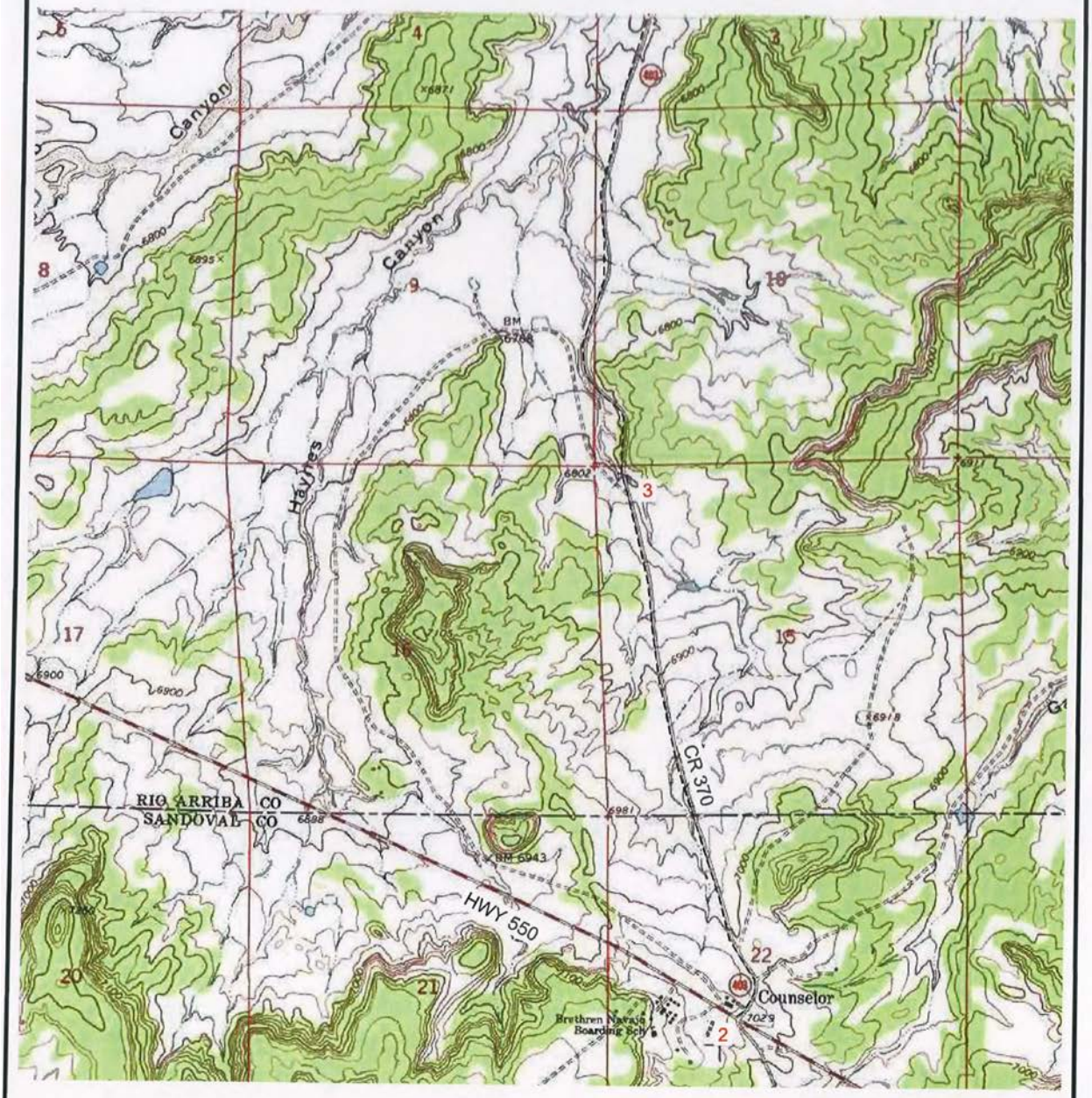
THIS DIAGRAM IS AN ESTIMATE OF DIRT BALANCE AND IS NOT INTENDED TO BE AN EXACT MEASURE OF VOLUME

FILL CUT

Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

LATITUDE: 36.247118° N
LONGITUDE: 107.411890° W
DATUM: NAD 83

ENCANA OIL & GAS (USA) INC.
LYBROOK A12-2306 #01H
81' FNL & 264' FEL
LOCATED IN THE NE/4 NE/4 OF SECTION 12,
T23N, R6W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO
GROUND ELEVATION: 6690.8', NAVD 88
±2820' OF NEW ACCESS ACROSS BLM LANDS
1 OF 4

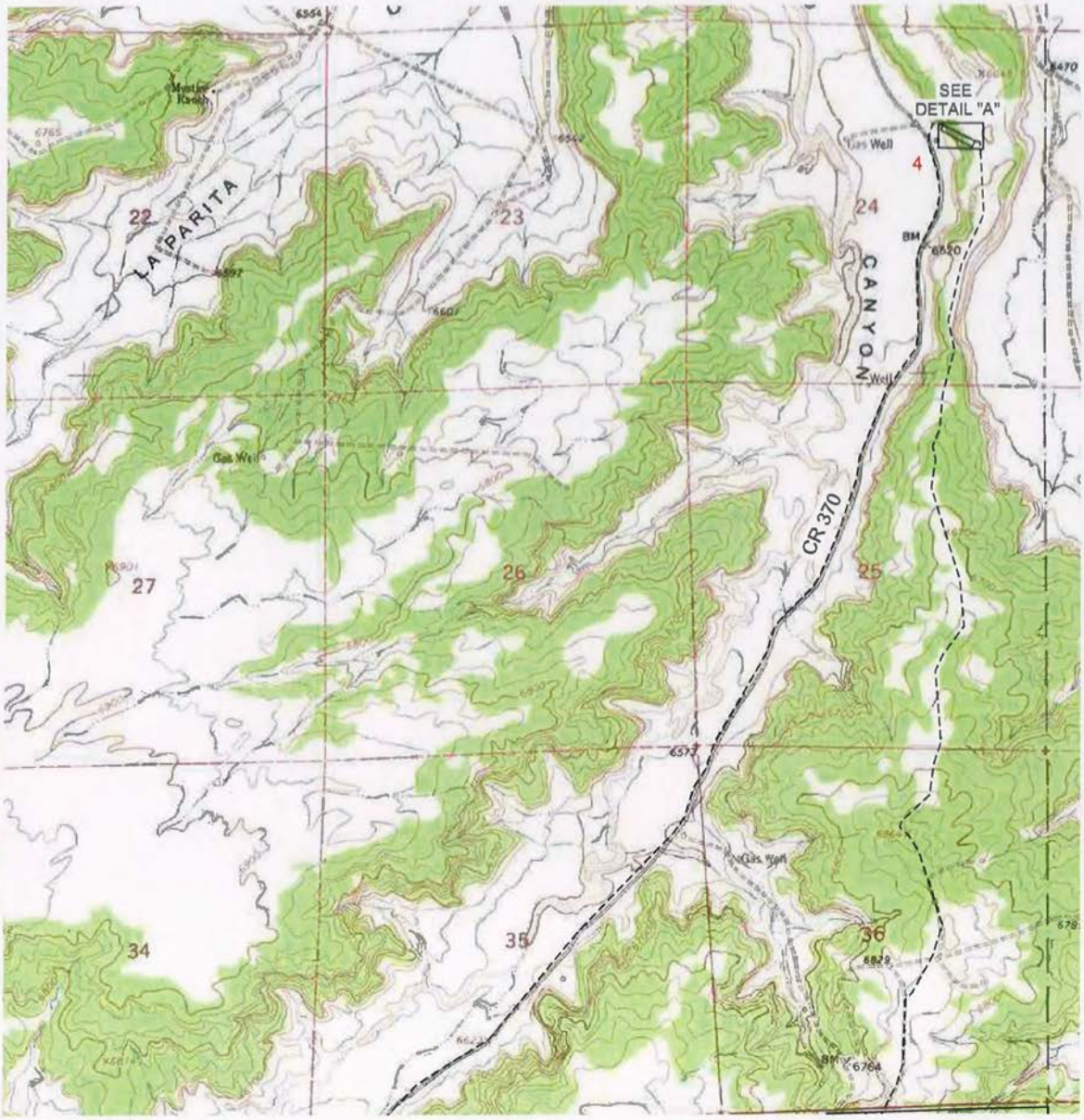


U.S.G.S. QUAD: COUNSELOR
SCALE: 1" = 2000' (1:24,000)
JOB No.: ENC090_REV2
DATE: 11/22/13

Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

LATITUDE: 36.247118° N
LONGITUDE: 107.411890° W
DATUM: NAD 83

ENCANA OIL & GAS (USA) INC.
LYBROOK A12-2306 #01H
81' FNL & 264' FEL
LOCATED IN THE NE/4 NE/4 OF SECTION 12,
T23N, R6W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO
GROUND ELEVATION: 6690.8', NAVD 88
±2820' OF NEW & UPGRADED ACCESS ACROSS BLM LANDS
2 OF 4



U.S.G.S. QUAD: COUNSELOR
SCALE: 1" = 2000' (1:24,000)
JOB No.: ENC090_REV2
DATE: 11/22/13

Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
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LATITUDE: 36.247118° N
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ENCANA OIL & GAS (USA) INC.
LYBROOK A12-2306 #01H
81' FNL & 264' FEL
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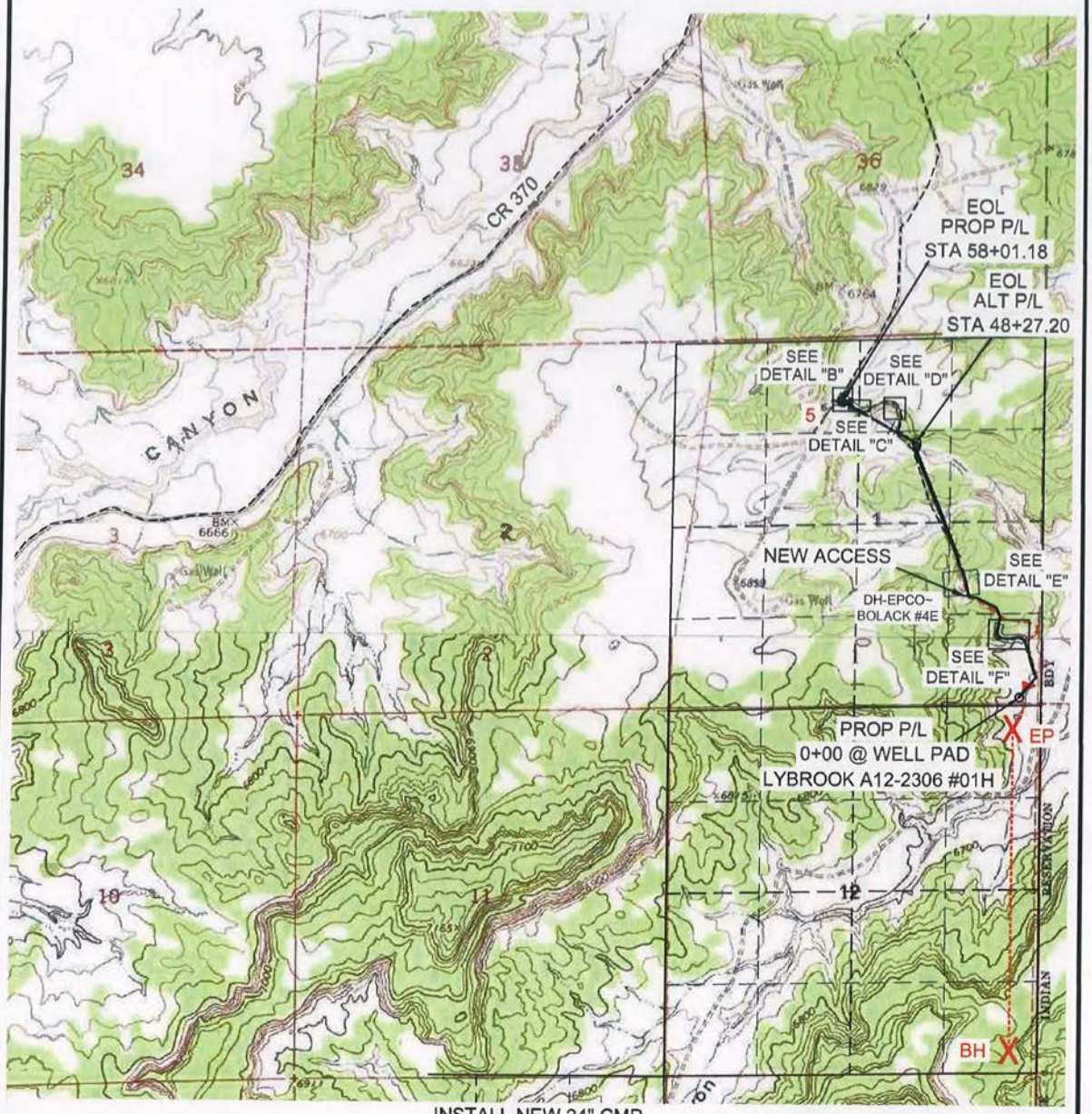
GROUND ELEVATION: 6690.8', NAVD 88
±2820' OF NEW ACCESS ACROSS BLM LANDS
3 OF 4



U.S.G.S. QUAD: COUNSELOR
SCALE: 1" = 2000' (1:24,000)
JOB No.: ENC090_REV2
DATE: 11/22/13

INSTALL NEW 24" CMP
STA. 2+29 - DRAINAGE
STA. 4+54 - DRAINAGE
STA. 6+68 - WASH X-ING
STA. 28+19.86 - @ PAD

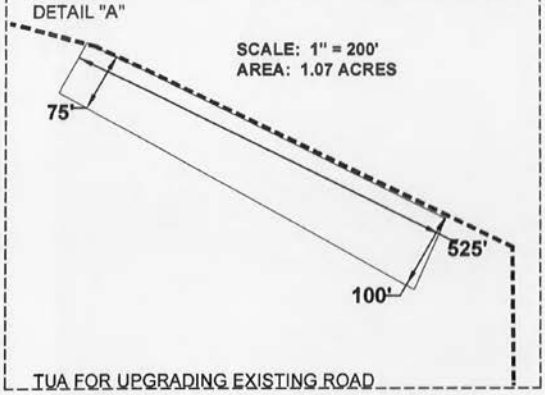
Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

LATITUDE: 36.247118° N
LONGITUDE: 107.411890° W
DATUM: NAD 83

ENCANA OIL & GAS (USA) INC.
LYBROOK A12-2306 #01H
81' FNL & 264' FEL
LOCATED IN THE NE/4 NE/4 OF SECTION 12,
T23N, R6W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO
GROUND ELEVATION: 6690.8', NAVD 88
±2820' OF NEW ACCESS ACROSS BLM LANDS
4 OF 4

DETAIL "A"

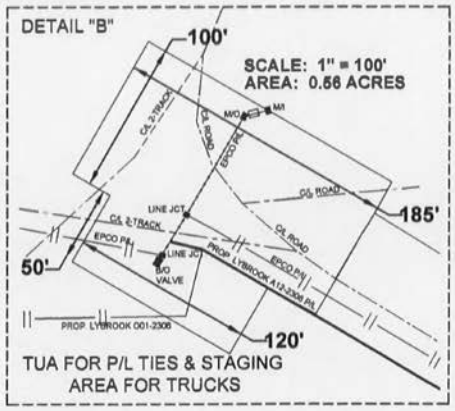
SCALE: 1" = 200'
AREA: 1.07 ACRES



TUA FOR UPGRADING EXISTING ROAD

DETAIL "B"

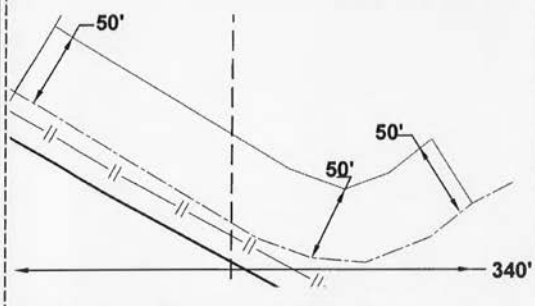
SCALE: 1" = 100'
AREA: 0.56 ACRES



TUA FOR P/L TIES & STAGING AREA FOR TRUCKS

DETAIL "C"

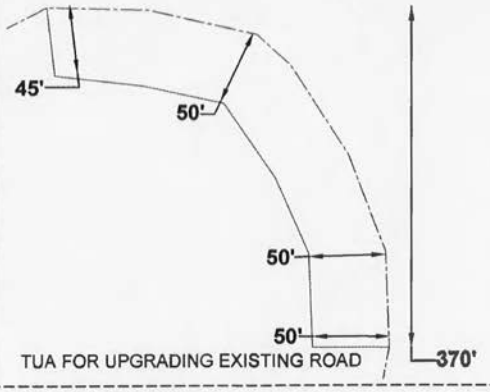
SCALE: 1" = 100'
AREA: 0.36 ACRES



TUA FOR UPGRADING EXISTING ROAD

DETAIL "D"

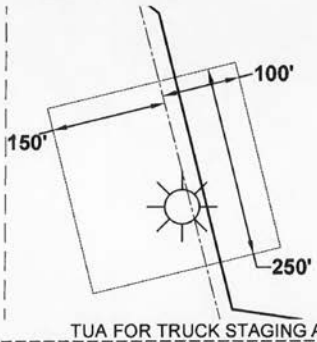
SCALE: 1" = 100'
AREA: 0.36 ACRES



TUA FOR UPGRADING EXISTING ROAD

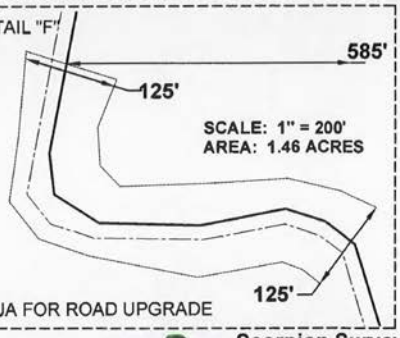
DETAIL "E"

SCALE: 1" = 200'
AREA: 1.43 ACRES



TUA FOR TRUCK STAGING AREA

DETAIL "F"



SCALE: 1" = 200'
AREA: 1.46 ACRES

TUA FOR ROAD UPGRADE

U.S.G.S. QUAD: COUNSELOR
SCALE: 1" = 2000' (1:24,000)
JOB No.: ENC090_REV2
DATE: 11/22/13

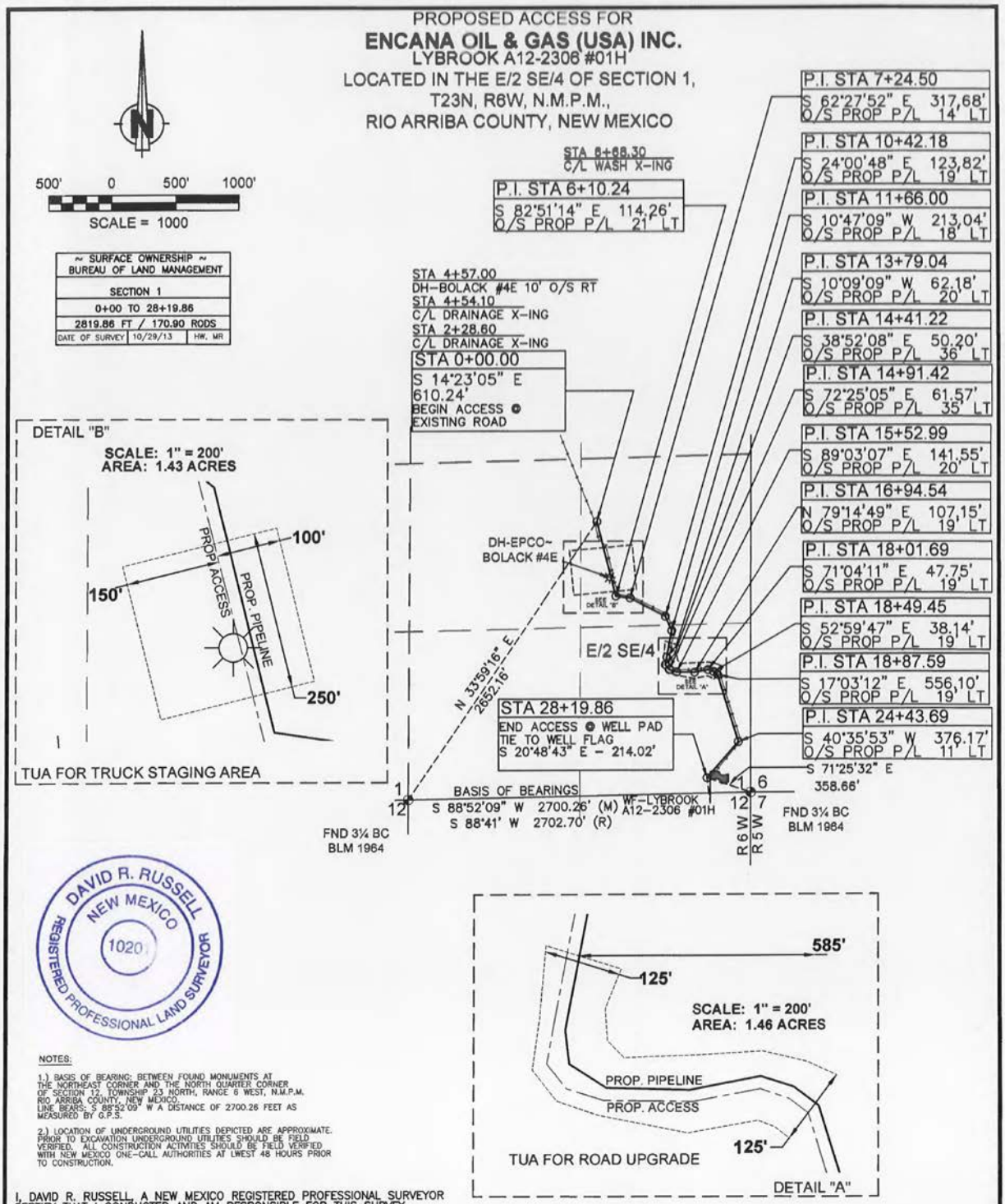
Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

PROPOSED ACCESS FOR

ENCANA OIL & GAS (USA) INC.

LYBROOK A12-2306 #01H

LOCATED IN THE E/2 SE/4 OF SECTION 1,
T23N, R6W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO



NOTES:

1.) BASIS OF BEARING: BETWEEN FOUND MONUMENTS AT THE NORTHEAST CORNER AND THE NORTH QUARTER CORNER OF SECTION 12, TOWNSHIP 23 NORTH, RANGE 6 WEST, N.M.P.M. RIO ARRIBA COUNTY, NEW MEXICO.
LINE BEARS: S 88°52'09" W A DISTANCE OF 2700.26 FEET AS MEASURED BY G.P.S.

2.) LOCATION OF UNDERGROUND UTILITIES DEPICTED ARE APPROXIMATE. PRIOR TO EXCAVATION UNDERGROUND UTILITIES SHOULD BE FIELD VERIFIED. ALL CONSTRUCTION ACTIVITIES SHOULD BE FIELD VERIFIED WITH NEW MEXICO ONE-CALL AUTHORITIES AT LWEST 48 HOURS PRIOR TO CONSTRUCTION.

I, DAVID R. RUSSELL, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

DATE: 1-24-2014

DAVID R. RUSSELL, PLS
NEW MEXICO L.S. #10201

JOB No.: ENC090_REV2 DATE: 11/22/13

Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

PROPOSED PIPELINE FOR

ENCANA OIL & GAS (USA) INC.

LYBROOK A12-2306 #01H

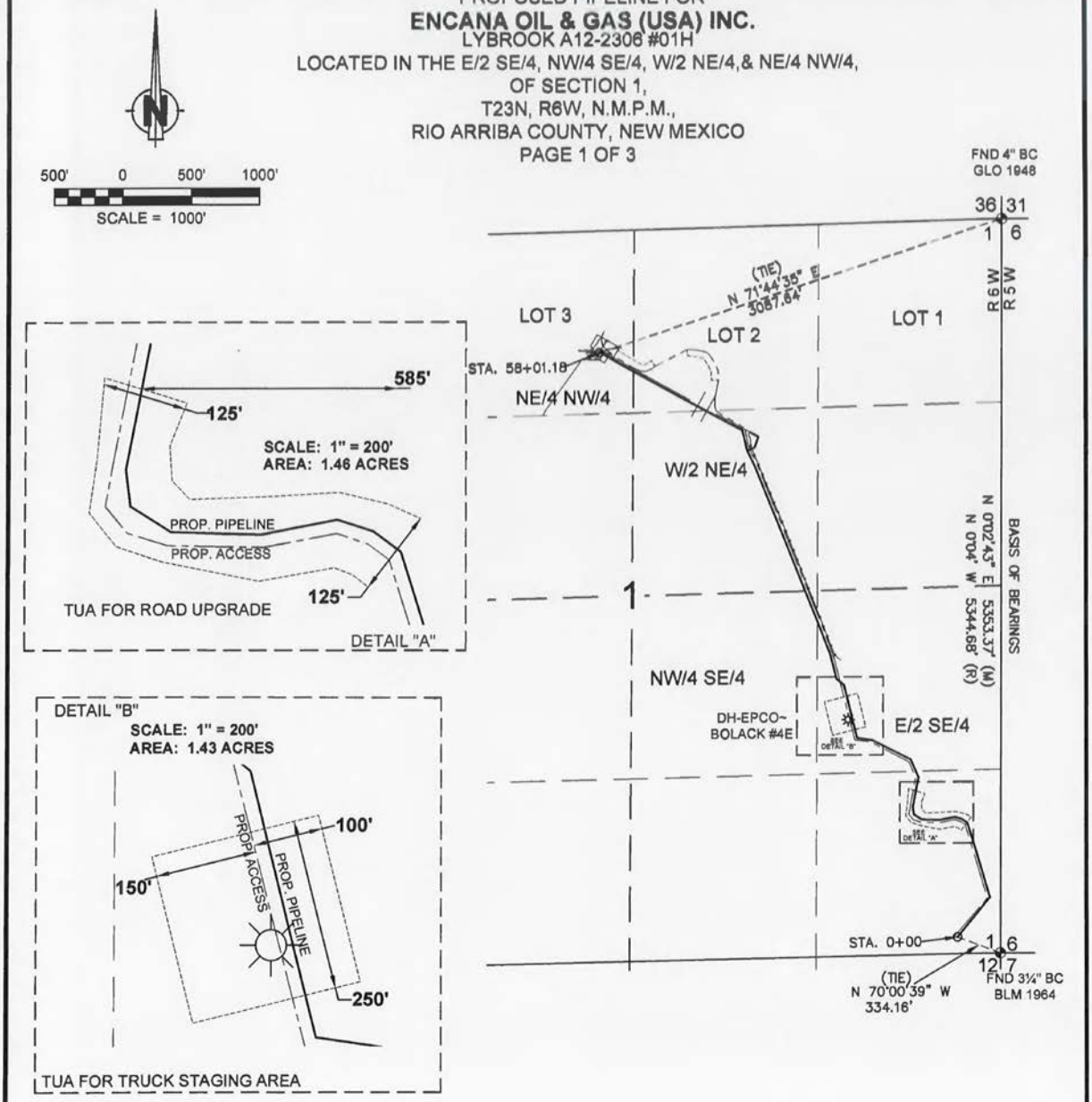
LOCATED IN THE E/2 SE/4, NW/4 SE/4, W/2 NE/4,& NE/4 NW/4,

OF SECTION 1,

T23N, R6W, N.M.P.M.,

RIO ARRIBA COUNTY, NEW MEXICO

PAGE 1 OF 3



NOTES:

1.) BASIS OF BEARING: BETWEEN FOUND MONUMENTS AT THE NORTHEAST CORNER AND THE SOUTHEAST CORNER OF SECTION 1, TOWNSHIP 23 NORTH, RANGE 6 WEST, N.M.P.M. RIO ARRIBA COUNTY, NEW MEXICO. LINE BEARS; N 0°02'43" E A DISTANCE OF 5353.37 FEET AS MEASURED BY G.P.S.

2.) LOCATION OF UNDERGROUND UTILITIES DEPICTED ARE APPROXIMATE. PRIOR TO EXCAVATION UNDERGROUND UTILITIES SHOULD BE FIELD VERIFIED. ALL CONSTRUCTION ACTIVITIES SHOULD BE FIELD VERIFIED WITH NEW MEXICO ONE-CALL AUTHORITIES AT LWEST 48 HOURS PRIOR TO CONSTRUCTION.

~ SURFACE OWNERSHIP ~ BUREAU OF LAND MANAGEMENT		
SECTION 1		
0+00 TO 58+01.18		
5801.18 FT/ 351.59 RODS		
DATE OF SURVEY	10/29/13	HW

I, DAVID R. RUSSELL, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

DAVID R. RUSSELL NEW MEXICO 10201 REGISTERED PROFESSIONAL LAND SURVEYOR

David R. Russell

DATE: 1-24-2014

DAVID R. RUSSELL, PLS
NEW MEXICO L.S. #10201

JOB No.: ENC090_REV2 DATE: 01/23/14

Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

PROPOSED PIPELINE FOR

ENCANA OIL & GAS (USA) INC.

LYBROOK A12-2306 #01H

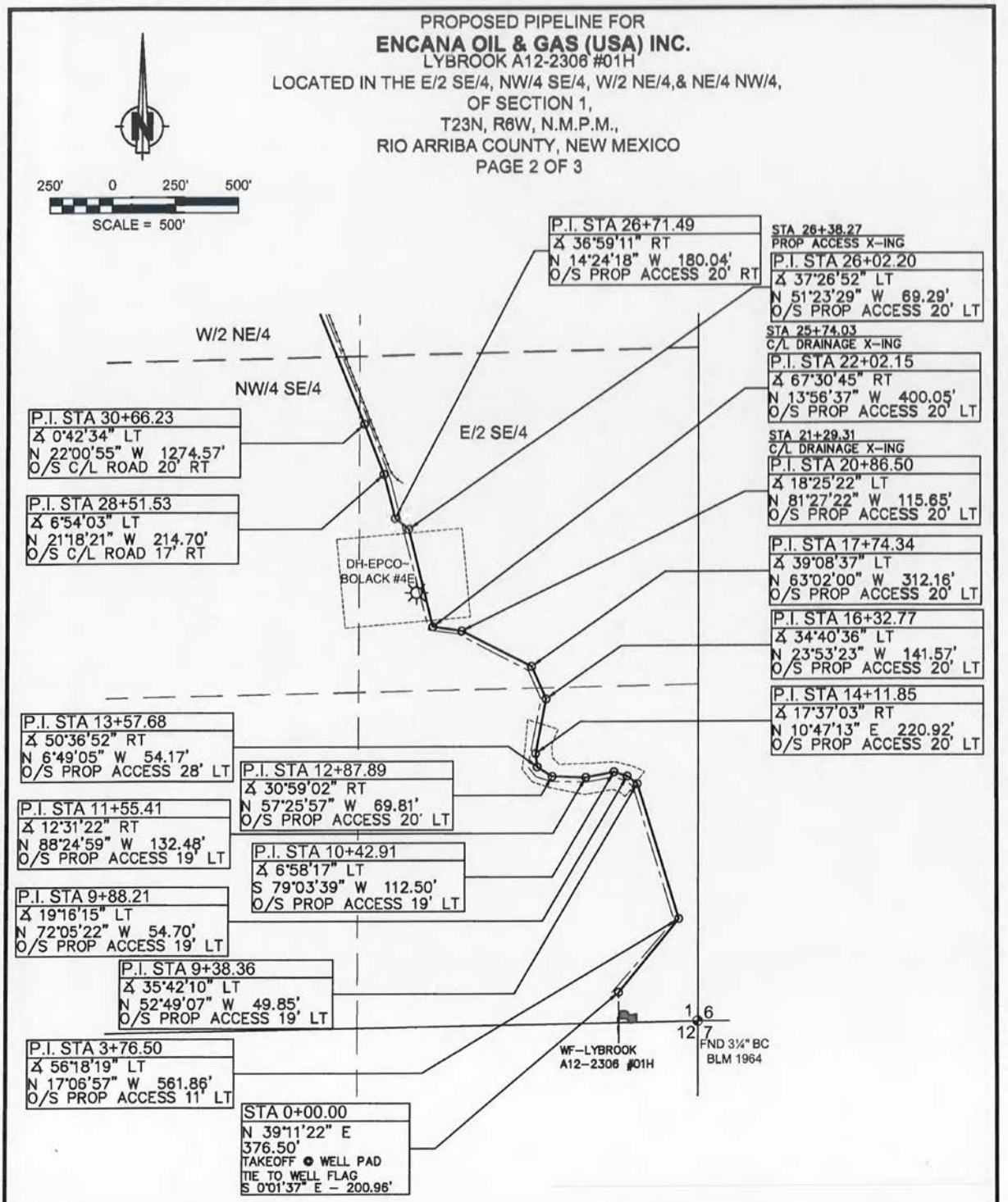
LOCATED IN THE E/2 SE/4, NW/4 SE/4, W/2 NE/4,& NE/4 NW/4,

OF SECTION 1,

T23N, R6W, N.M.P.M.,

RIO ARRIBA COUNTY, NEW MEXICO

PAGE 2 OF 3



Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

JOB No.: ENC090_REV2 DATE: 01/23/14

PROPOSED PIPELINE FOR

ENCANA OIL & GAS (USA) INC.

LYBROOK A12-2306 #01H

LOCATED IN THE E/2 SE/4, NW/4 SE/4, W/2 NE/4,& NE/4 NW/4,

OF SECTION 1,

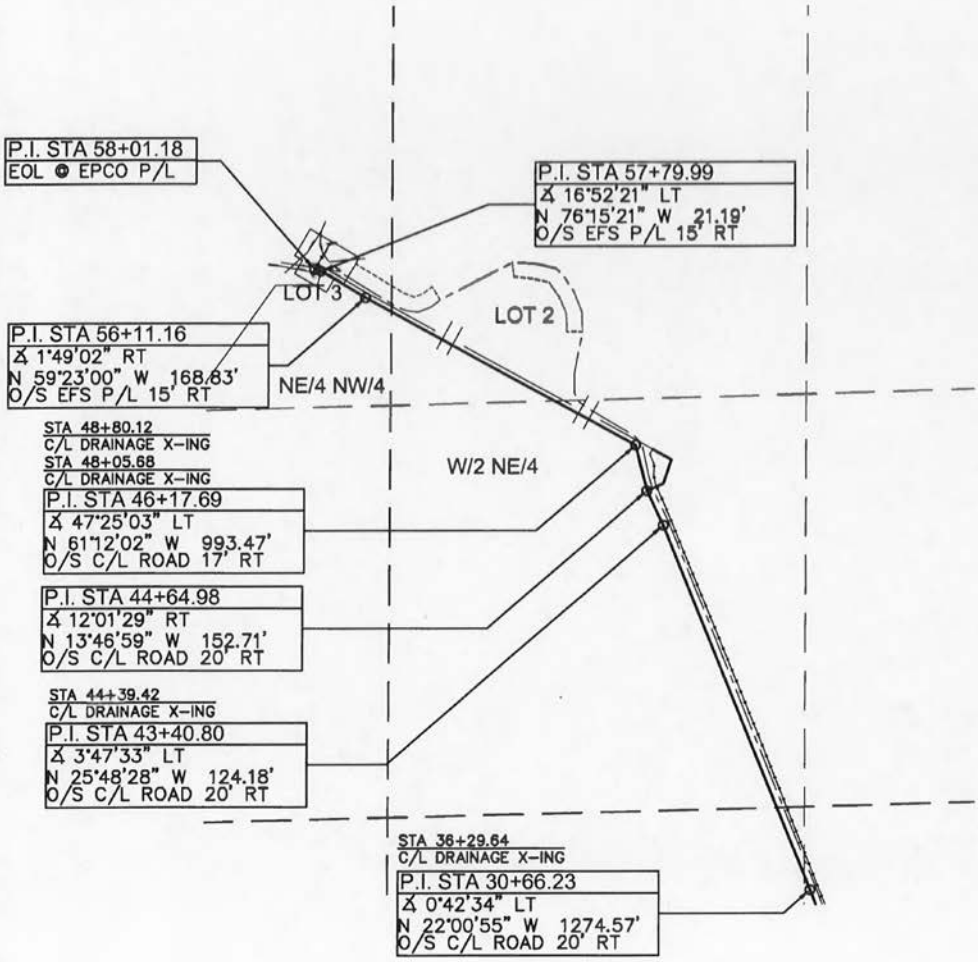
T23N, R6W, N.M.P.M.,

RIO ARRIBA COUNTY, NEW MEXICO

PAGE 3 OF 3

250' 0 250' 500'

SCALE = 500'



JOB No.: ENC090_REV2 DATE: 01/23/14

Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

B.2. Lybrook O01

DISTRICT I
1625 N. French Dr., Hobbs, N.M. 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
DISTRICT II
611 S. First St., Artesia, N.M. 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
DISTRICT III
1000 Rio Brazos Rd., Aztec, N.M. 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
	13379	COUNSELORS GALLUP - DAKOTA

[4] Property Code	[5] Property Name	[6] Well Number
	LYBROOK 001-2306	01H

[7] OGRID No.	[8] Operator Name	[9] Elevation
282327	ENCANA OIL & GAS (USA) INC.	6882.6'

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	WEST/West line	County
O	1	23N	6W		729'	SOUTH	2540'	EAST	RIO ARRIBA

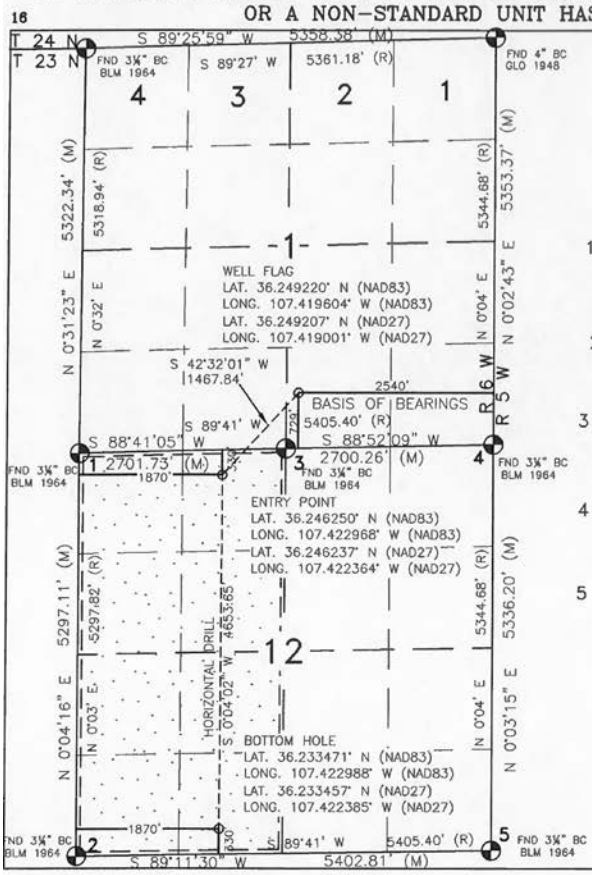
[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	WEST/West line	County
N	12	23N	6W		330'	SOUTH	1870'	WEST	RIO ARRIBA

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
PROJECT AREA 320 ACRES - W/2 SEC. 12			

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



1 LAT. 36.247039° N (NAD83)
LONG. 107.429304° W (NAD83)
LAT. 36.247039° N (NAD27)
LONG. 107.428700° W (NAD27)

2 LAT. 36.232493° N (NAD83)
LONG. 107.429327° W (NAD83)
LAT. 36.232479° N (NAD27)
LONG. 107.428723° W (NAD27)

3 LAT. 36.247209° N (NAD83)
LONG. 107.420148° W (NAD83)
LAT. 36.247196° N (NAD27)
LONG. 107.419545° W (NAD27)

4 LAT. 36.247354° N (NAD83)
LONG. 107.410996° W (NAD83)
LAT. 36.247341° N (NAD27)
LONG. 107.410393° W (NAD27)

5 LAT. 36.232701° N (NAD83)
LONG. 107.411017° W (NAD83)
LAT. 36.232687° N (NAD27)
LONG. 107.410414° W (NAD27)

18

[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

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 26, 2013
Date of Survey

Signature and Seal of Professional Surveyor:

DAVID R. RUSSELL NEW MEXICO 10201 REGISTERED PROFESSIONAL LAND SURVEYOR

DAVID RUSSELL

Certificate Number 10201

DISTRICT I
1625 N. French Dr., Hobbs, N.M. 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

DISTRICT II
811 S. First St., Artesia, N.M. 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

DISTRICT III
1000 Rio Brazos Rd., Aztec, N.M. 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
	13379	COUNSELORS GALLUP - DAKOTA

[4] Property Code	[5] Property Name	[6] Well Number
	LYBROOK 001-2306	02H

[7] OGRID No.	[8] Operator Name	[9] Elevation
282327	ENCANA OIL & GAS (USA) INC.	6882.6'

[10] Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	WEST/West line	County
O	1	23N	6W		739'	SOUTH	2512'	EAST	RIO ARRIBA

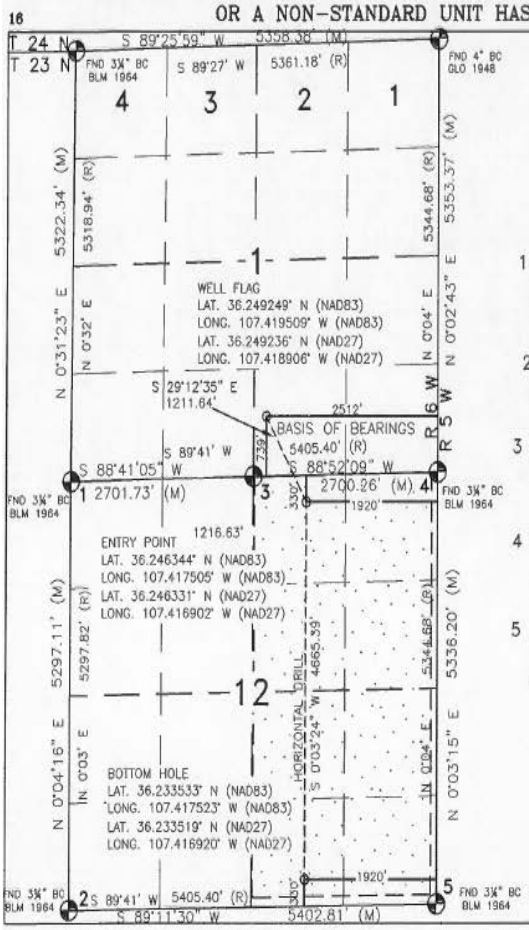
[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	WEST/West line	County
N	12	23N	6W		330'	SOUTH	1920'	EAST	RIO ARRIBA

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
PROJECT AREA 320 ACRES - E/2 SEC. 12			

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



1 LAT. 36.247039° N (NAD83)
LONG. 107.429304° W (NAD83)
LAT. 36.247039° N (NAD27)
LONG. 107.428700° W (NAD27)

2 LAT. 36.232493° N (NAD83)
LONG. 107.429327° W (NAD83)
LAT. 36.232479° N (NAD27)
LONG. 107.428723° W (NAD27)

3 LAT. 36.247209° N (NAD83)
LONG. 107.420148° W (NAD83)
LAT. 36.247196° N (NAD27)
LONG. 107.419545° W (NAD27)

4 LAT. 36.247354° N (NAD83)
LONG. 107.410996° W (NAD83)
LAT. 36.247341° N (NAD27)
LONG. 107.410393° W (NAD27)

5 LAT. 36.232701° N (NAD83)
LONG. 107.411017° W (NAD83)
LAT. 36.232687° N (NAD27)
LONG. 107.410414° W (NAD27)

18

[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

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 26, 2013
Date of Survey

Signature and Seal of Professional Surveyor:

DAVID R. RUSSELL
NEW MEXICO
10201
REGISTERED PROFESSIONAL LAND SURVEYOR

DAVID RUSSELL

Certificate Number 10201

WELL FLAG
LATITUDE: 36.249220° N
LONGITUDE: 107.419604° W
DATUM: NAD83

ENCANA OIL & GAS (USA) INC.

LYBROOK O01-2306 #01H
729' FSL & 2540' FEL
LOCATED IN THE SW/4 SE/4 OF SECTION 1,
T23N, R6W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO
GROUND ELEVATION: 6881', NAVD 88
FINISHED PAD ELEVATION: 6882.6', NAVD 88

9° 44' E
MN
TN
50' 0 50' 100'
SCALE = 100'

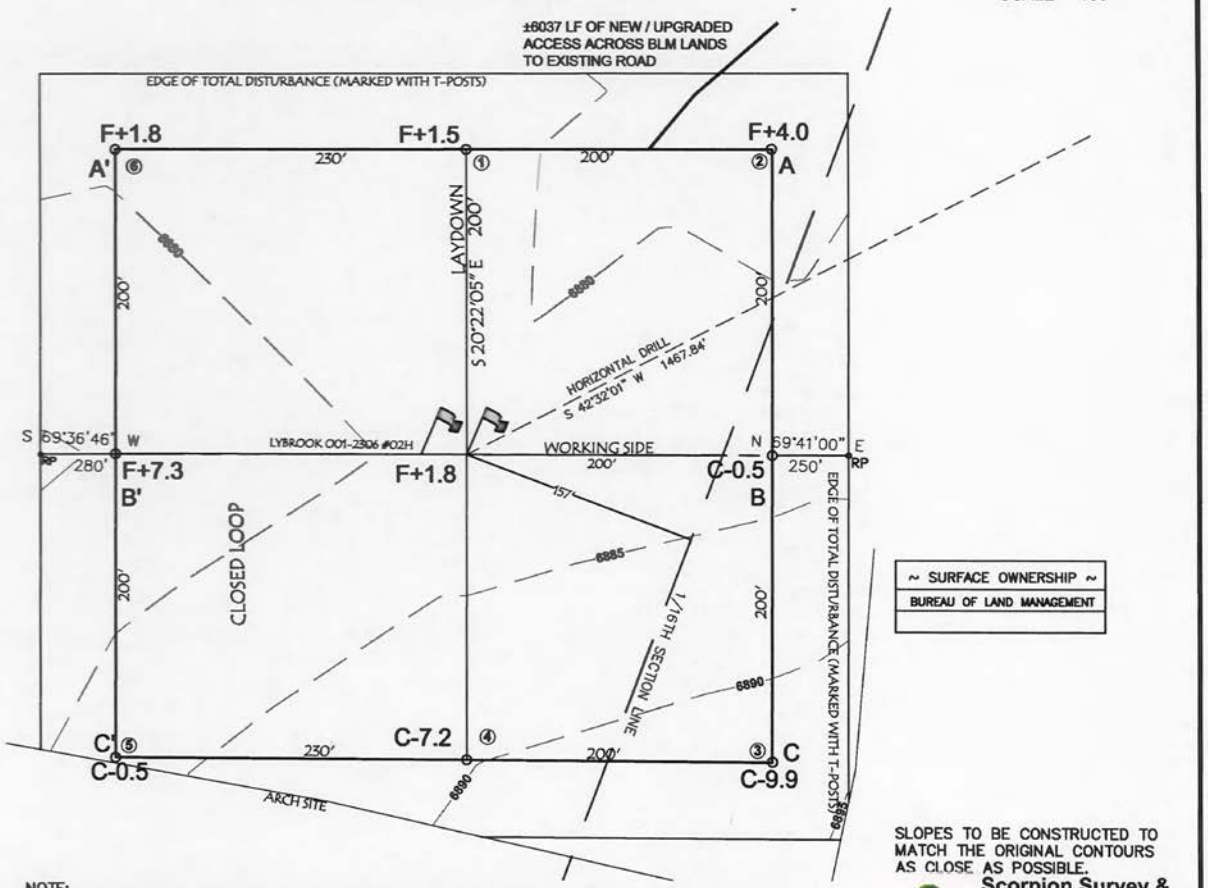
NOTES

1.) BASIS OF BEARING: BETWEEN FOUND MONUMENTS AT THE SOUTHEAST CORNER AND THE SOUTH QUARTER CORNER OF SECTION 1, TOWNSHIP 23 NORTH, RANGE 6 WEST, N.M.P.M. RIO ARRIBA COUNTY, NEW MEXICO.
LINE BEARS: S 88°52'09" W A DISTANCE OF 2700.26 FEET AS MEASURED BY G.P.S.

2.) LATITUDE, LONGITUDE AND ELLIPSOIDAL HEIGHT BASED ON AZTEC CORS L1 PHASE CENTER.
DISTANCES SHOWN ARE GROUND DISTANCES USING A TRAVERSE MERCATOR PROJECTION FROM A WGS84 ELLIPSOID, CONVERTED TO NAD83.
NAVD88 ELEVATIONS AS PREDICTED BY GEOID03.

3.) LOCATION OF UNDERGROUND UTILITIES DEPICTED ARE APPROXIMATE. PRIOR TO EXCAVATION UNDERGROUND UTILITIES SHOULD BE FIELD VERIFIED. ALL CONSTRUCTION ACTIVITIES SHOULD BE FIELD VERIFIED WITH NEW MEXICO ONE-CALL AUTHORITIES AT LWEST 48 HOURS PRIOR TO CONSTRUCTION.

4.) T-POSTS HAVE BEEN SET TO DEFINE THE EDGE OF DISTURBANCE LIMITS WHICH ARE 50' OFFSETS FROM THE EDGE OF THE STAKED WELL PAD.



~ SURFACE OWNERSHIP ~
BUREAU OF LAND MANAGEMENT

SLOPES TO BE CONSTRUCTED TO MATCH THE ORIGINAL CONTOURS AS CLOSE AS POSSIBLE.

TOTAL PERMITTED AREA
530' x 500' = 6.08 ACRES
SCALE: 1" = 100'
JOB No.: ENC088_REV1
DATE: 12/05/13
DRAWN BY: TWT

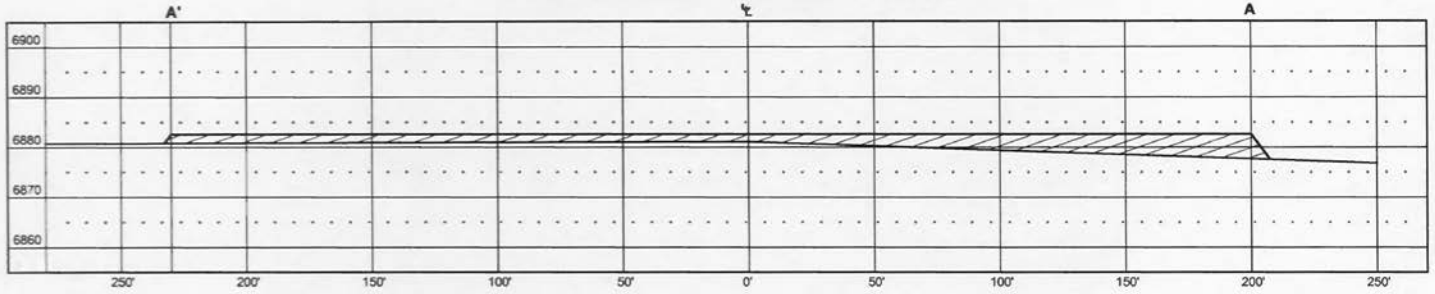
NOTE:
SCORPION SURVEY & CONSULTING, L.L.C. IS NOT LIABLE FOR UNDERGROUND UTILITIES OR PIPELINES. CONTRACTOR SHOULD CALL ONE-CALL FOR LOCATION OF ANY MARKED OR UNMARKED, BURIED PIPELINES OR CABLES ON WELL PAD, IN CONSTRUCTION ZONE AND/OR ACCESS ROAD AT LWEST TWO (2) WORKING DAYS PRIOR TO CONSTRUCTION.

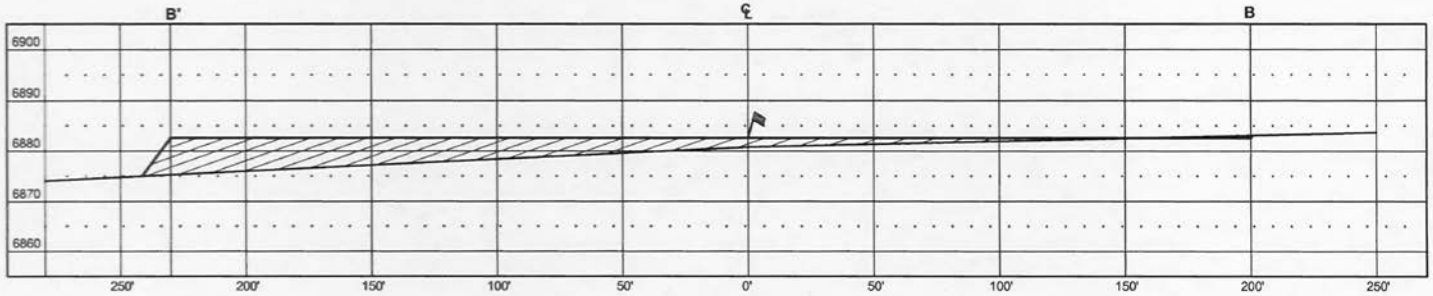
Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

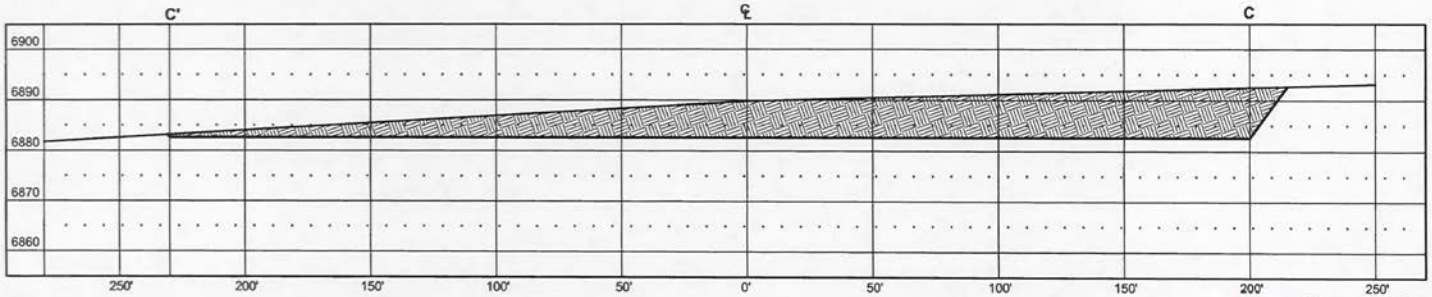
ENCANA OIL & GAS (USA) INC.

LYBROOK O01-2306 #01H
729' FSL & 2540' FEL
LOCATED IN THE SW/4 SE/4 OF SECTION 1, T23N, R6W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO
GROUND ELEVATION: 6881', NAVD 88
FINISHED PAD ELEVATION: 6882.6', NAVD 88

LATITUDE: 36.249220° N
LONGITUDE: 107.419604° W
DATUM: NAD 83







VERT. SCALE: 1" = 30'
HORZ. SCALE: 1" = 60'
JOB No.: ENC088_REV1
DATE: 12/05/13

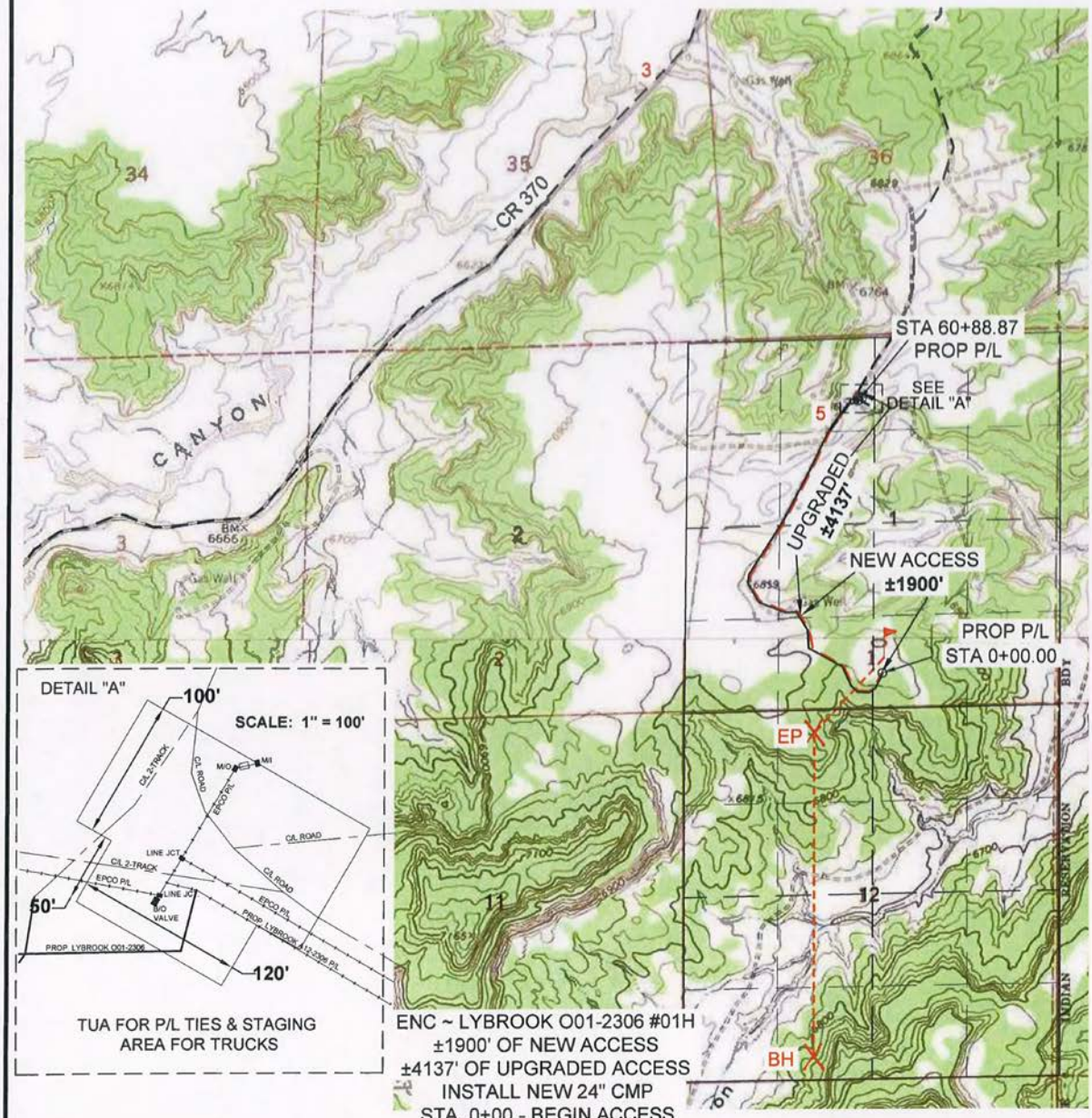
THIS DIAGRAM IS AN ESTIMATE OF DIRT BALANCE AND IS NOT INTENDED TO BE AN EXACT MEASURE OF VOLUME

FILL CUT

Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

LATITUDE: 36.249220° N
LONGITUDE: 107.419604° W
DATUM: NAD 83

ENCANA OIL & GAS (USA) INC.
LYBROOK O01-2306 #01H
729' FSL & 2540' FEL
LOCATED IN THE SW/4 SE/4 OF SECTION 1,
T23N, R6W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO
GROUND ELEVATION: 6881', NAVD 88
±6037' OF NEW & UPGRADED ACCESS ACROSS BLM LANDS



ENC ~ LYBROOK O01-2306 #01H
±1900' OF NEW ACCESS
±4137' OF UPGRADED ACCESS
INSTALL NEW 24" CMP
STA. 0+00 - BEGIN ACCESS
STA. 51+23.40 - WASH X-ING
STA. 53+99.43 - WASH X-ING
STA. 54+97.51 - WASH X-ING
STA. 60+36.70 - @ PAD

U.S.G.S. QUAD: COUNSELOR
SCALE: 1" = 2000' (1:24,000)
JOB No.: ENC088_REV1
DATE: 12/05/13

Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

LATITUDE: 36.249220° N
LONGITUDE: 107.419604° W
DATUM: NAD 83

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LYBROOK O01-2306 #01H
729' FSL & 2540' FEL
LOCATED IN THE SW/4 SE/4 OF SECTION 1,
T23N, R6W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO
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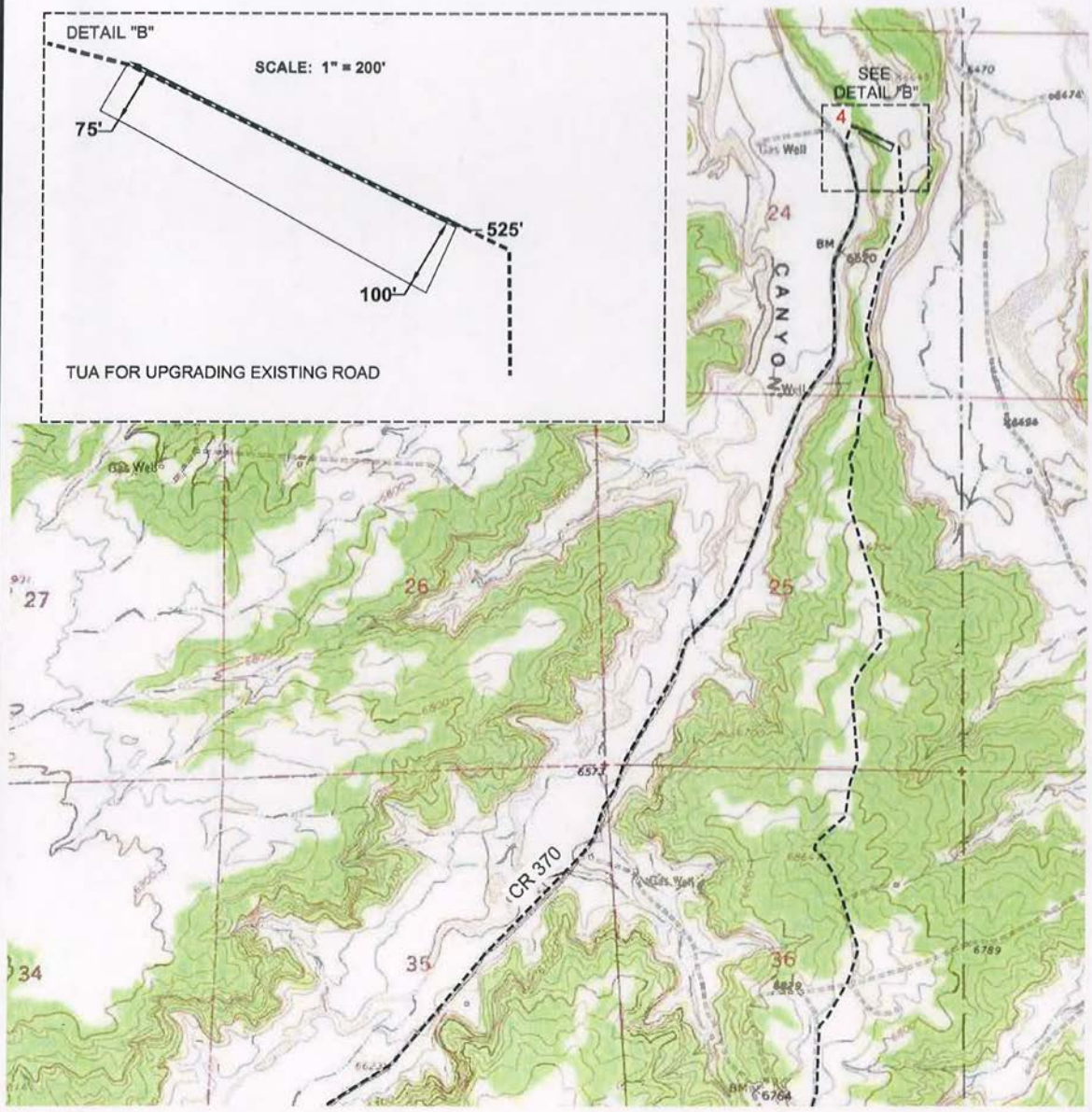

U.S.G.S. QUAD: COUNSELOR
SCALE: 1" = 2000' (1:24,000)
JOB No.: ENC088_REV1
DATE: 12/05/13

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302 South Ash
Aztec, New Mexico 87410
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LATITUDE: 36.249220° N
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ENCANA OIL & GAS (USA) INC.
LYBROOK O01-2306 #01H
729' FSL & 2540' FEL
LOCATED IN THE SW/4 SE/4 OF SECTION 1,
T23N, R6W, N.M.P.M.,
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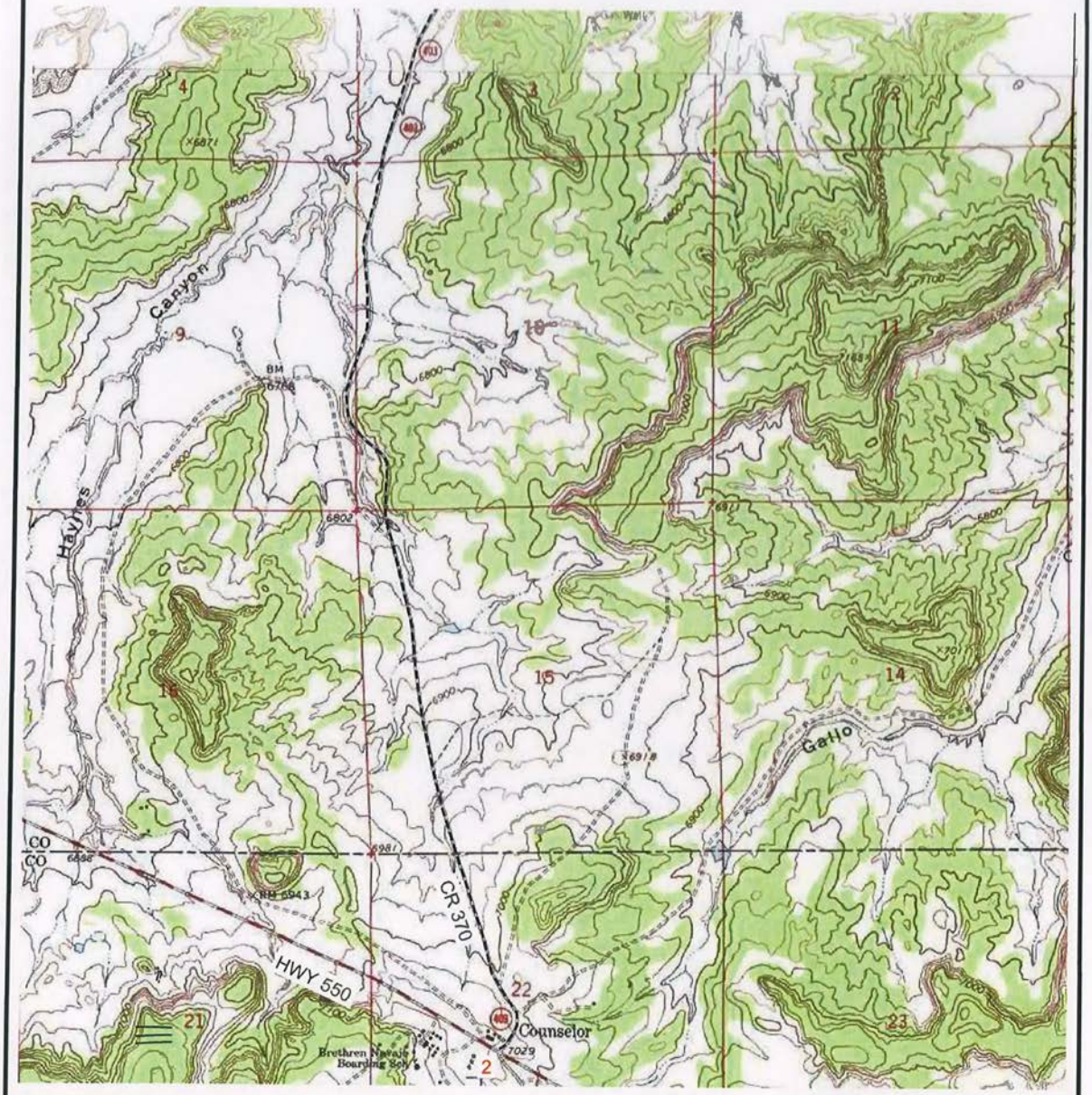
GROUND ELEVATION: 6881', NAVD 88
±6037' OF NEW & UPGRADED ACCESS ACROSS BLM LANDS



U.S.G.S. QUAD: COUNSELOR
SCALE: 1" = 2000' (1:24,000)
JOB No.: ENC088_REV1
DATE: 12/05/13

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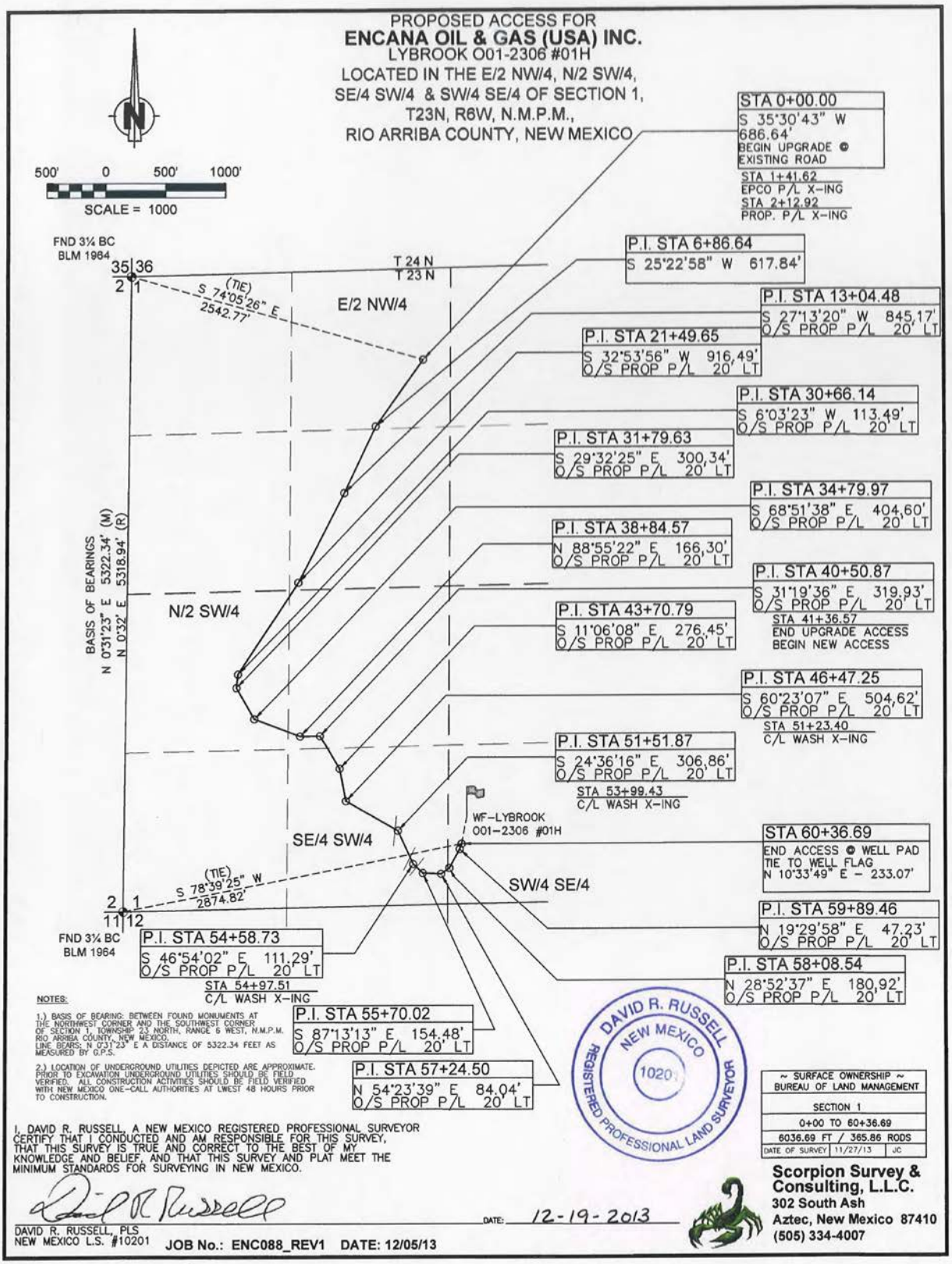
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007


PROPOSED ACCESS FOR
ENCANA OIL & GAS (USA) INC.
LYBROOK O01-2306 #01H
LOCATED IN THE E/2 NW/4, N/2 SW/4,
SE/4 SW/4 & SW/4 SE/4 OF SECTION 1,
T23N, R6W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO
500' 0 500' 1000'
SCALE = 1000
STA 0+00.00
S 35°30'43" W
686.64'
BEGIN UPGRADE @
EXISTING ROAD
STA 1+41.62
EPCO P/L X-ING
STA 2+12.92
PROP. P/L X-ING
FND 3¼ BC
BLM 1964
35 36
2 1
T 24 N
T 23 N
(TIE)
S 74°05'26" E
2542.77'
E/2 NW/4
P.I. STA 6+86.64
S 25°22'58" W 617.84'
P.I. STA 13+04.48
S 27°13'20" W 845.17'
O/S PROP P/L 20' LT
P.I. STA 21+49.65
S 32°53'56" W 916.49'
O/S PROP P/L 20' LT
P.I. STA 30+66.14
S 6°03'23" W 113.49'
O/S PROP P/L 20' LT
P.I. STA 31+79.63
S 29°32'25" E 300.34'
O/S PROP P/L 20' LT
P.I. STA 34+79.97
S 68°51'38" E 404.60'
O/S PROP P/L 20' LT
P.I. STA 38+84.57
N 88°55'22" E 166.30'
O/S PROP P/L 20' LT
P.I. STA 40+50.87
S 31°19'36" E 319.93'
O/S PROP P/L 20' LT
STA 41+36.57
END UPGRADE ACCESS
BEGIN NEW ACCESS
BASIS OF BEARINGS
N 0°31'23" E 5322.34' (M)
N 0°32' E 5318.94' (R)
N/2 SW/4
P.I. STA 43+70.79
S 11°06'08" E 276.45'
O/S PROP P/L 20' LT
P.I. STA 46+47.25
S 60°23'07" E 504.62'
O/S PROP P/L 20' LT
STA 51+23.40
C/L WASH X-ING
P.I. STA 51+51.87
S 24°36'16" E 306.86'
O/S PROP P/L 20' LT
STA 53+99.43
C/L WASH X-ING
WF-LYBROOK
001-2306 #01H
SE/4 SW/4
STA 60+36.69
END ACCESS @ WELL PAD
TIE TO WELL FLAG
N 10°33'49" E - 233.07'
(TIE)
S 78°39'25" W
2874.82'
SW/4 SE/4
2 1
11 12
P.I. STA 59+89.46
N 19°29'58" E 47.23'
O/S PROP P/L 20' LT
FND 3¼ BC
BLM 1964
P.I. STA 54+58.73
S 46°54'02" E 111.29'
O/S PROP P/L 20' LT
STA 54+97.51
C/L WASH X-ING
P.I. STA 58+08.54
N 28°52'37" E 180.92'
O/S PROP P/L 20' LT
NOTES:
1.) BASIS OF BEARING: BETWEEN FOUND MONUMENTS AT THE NORTHWEST CORNER AND THE SOUTHWEST CORNER OF SECTION 1, TOWNSHIP 23 NORTH, RANGE 6 WEST, N.M.P.M. RIO ARRIBA COUNTY, NEW MEXICO. LINE BEARS: N 0°31'23" E A DISTANCE OF 5322.34 FEET AS MEASURED BY G.P.S.
2.) LOCATION OF UNDERGROUND UTILITIES DEPICTED ARE APPROXIMATE. PRIOR TO EXCAVATION UNDERGROUND UTILITIES SHOULD BE FIELD VERIFIED. ALL CONSTRUCTION ACTIVITIES SHOULD BE FIELD VERIFIED WITH NEW MEXICO ONE-CALL AUTHORITIES AT LWEST 48 HOURS PRIOR TO CONSTRUCTION.
P.I. STA 55+70.02
S 87°13'13" E 154.48'
O/S PROP P/L 20' LT
P.I. STA 57+24.50
N 54°23'39" E 84.04'
O/S PROP P/L 20' LT
DAVID R. RUSSELL
NEW MEXICO
1020
REGISTERED PROFESSIONAL LAND SURVEYOR
~ SURFACE OWNERSHIP ~
BUREAU OF LAND MANAGEMENT
SECTION 1
0+00 TO 60+36.69
6036.69 FT / 365.86 RODS
DATE OF SURVEY 11/27/13 JC
I, DAVID R. RUSSELL, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.
DATE: 12-19-2013
DAVID R. RUSSELL, PLS
NEW MEXICO L.S. #10201
JOB No.: ENC088_REV1 DATE: 12/05/13
Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

PROPOSED PIPELINE FOR

ENCANA OIL & GAS (USA) INC.

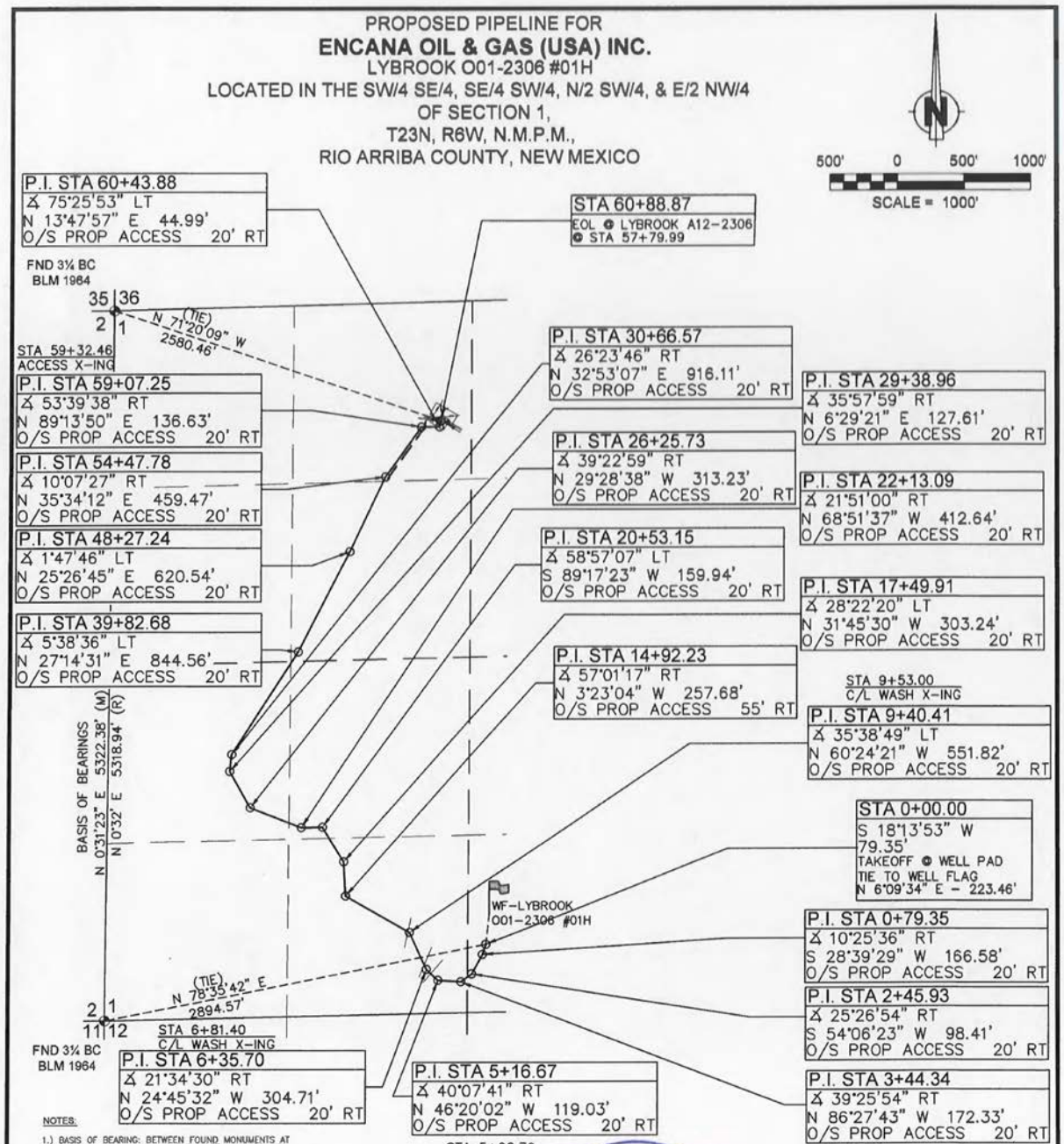
LYBROOK O01-2306 #01H

LOCATED IN THE SW/4 SE/4, SE/4 SW/4, N/2 SW/4, & E/2 NW/4

OF SECTION 1,

T23N, R6W, N.M.P.M.,

RIO ARRIBA COUNTY, NEW MEXICO



NOTES:

1.) BASIS OF BEARING: BETWEEN FOUND MONUMENTS AT THE SOUTHWEST CORNER AND THE NORTHWEST CORNER OF SECTION 1, TOWNSHIP 23 NORTH, RANGE 6 WEST, N.M.P.M. RIO ARRIBA COUNTY, NEW MEXICO. LINE BEARS: N 0°31'23" E A DISTANCE OF 5322.38 FEET AS MEASURED BY G.P.S.

2.) LOCATION OF UNDERGROUND UTILITIES DEPICTED ARE APPROXIMATE. PRIOR TO EXCAVATION UNDERGROUND UTILITIES SHOULD BE FIELD VERIFIED. ALL CONSTRUCTION ACTIVITIES SHOULD BE FIELD VERIFIED WITH NEW MEXICO ONE-CALL AUTHORITIES AT LWEST 48 HOURS PRIOR TO CONSTRUCTION.

~ SURFACE OWNERSHIP ~ BUREAU OF LAND MANAGEMENT	
SECTION 1	
0+00 TO 60+88.87	
6088.87 FT / 369.02 RODS	
DATE OF SURVEY 11/27/13	JC

I, DAVID R. RUSSELL, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

DATE: 12-19-2013

DAVID R. RUSSELL, PLS
NEW MEXICO L.S. #10201

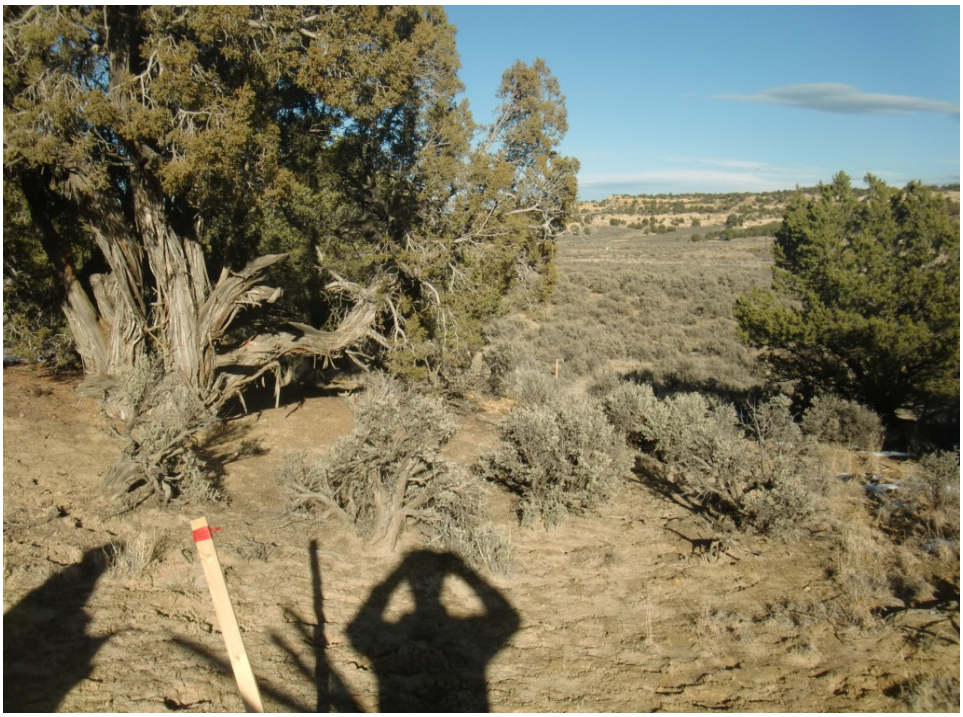
JOB No.: ENC088_REV1 DATE: 12/05/13

Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

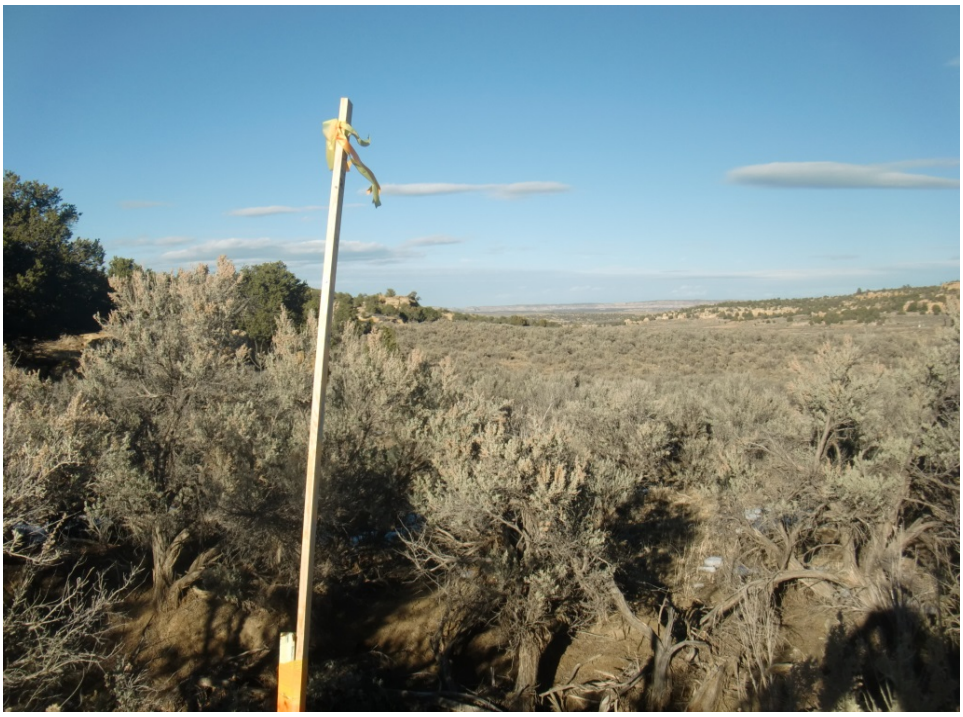
APPENDIX C. PHOTOGRAPHS

C.1. Lybrook A12

Proposed pipeline tie corridor (approximate stationing 26+71.49) and northern terminus of proposed access road, looking toward well pad



Proposed access road/pipeline tie corridor, from end (southern terminus) looking away from proposed well pad



Proposed well pad, looking northward from wellhead

Proposed well pad, looking eastward from wellhead

Proposed well pad, looking southward from wellhead

Proposed well pad, looking westward from wellhead

Proposed well pad, looking northeastward from southern corner (Corner 2)

Proposed well pad, looking southeastward from western corner (Corner 3)

Proposed well pad, looking southwestward from northern corner (Corner 5)

Proposed well pad, looking northwestward from eastern corner (Corner 6)

TUA 1, viewed from northeastern end looking southwestward

C.2. Lybrook O01

Proposed access road/pipeline corridor, from approximate station 41+37, looking southeastward

Proposed access road/pipeline corridor, from southeastern terminus, looking southwestward

Proposed well pad, looking northward from wellheads

Proposed well pad, looking eastward from wellheads

Proposed well pad, looking southward from wellheads

Proposed well pad, looking westward from wellheads

Proposed well pad, viewed from northwestern corner (corner 3) of well pad, looking southeastward

Proposed well pad, viewed from northeastern corner (corner 5) looking southwestward

Proposed well pad, view from southeastern corner (corner 6) of well pad, looking northwestward

Proposed well pad, viewed from southwestern corner (corner 2) of well pad, looking northeastward

C.3. Proposed Road Closure

Proposed road closure, from near northwestern terminus facing westward.

Road closure, from near southwestern terminus terminus facing northward

APPENDIX D. RECLAMATION PLANS