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Encana Oil & Gas (USA) Inc.'s Escrito D32-2408 Nos. 01H & 02H & Escrito M32-2408 No. 01H Oil and Natural Gas Wells Projects

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

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TABLE OF CONTENTS

1. Purpose and Need for Action 1
    1.1. Background 1
    1.2. Purpose and Need for Action 2
    1.3. Decision to be Made 2
    1.4. Conformance with Applicable Land Use Plan(s) 2
    1.5. Relationship to Statutes, Regulations or Other Plans 2
    1.6. Scoping, Public Involvement, and Issues 4
2. Proposed Action and Alternative(s) 6
    2.1. Proposed Action 6
    2.2. No Action 18
    2.3. Alternatives Analyzed in Detail 19
    2.4. Alternatives Considered but Eliminated from Detailed Study 20
3. Affected Environment and Environmental Consequences 22
    3.1. Air Resources 22
    3.2. Groundwater Resources 26
    3.3. Upland Vegetation 27
    3.4. Wildlife 29
    3.5. Special Status Species 32
    3.6. Cultural Resources 34
    3.7. Livestock 35
4. Supporting Information 37
    4.1. Tribes, Individuals, Organizations, or Agencies Consulted 37
    4.2. List of Preparers 37
    4.3. References 38

Appendix A. Maps 42
Appendix B. Biological Survey Report 46
Appendix C. Plats 47
Appendix D. Photographs 62

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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) to the Bureau of Land Management – Farmington Field Office (BLM-FFO) for the following oil and natural gas well projects:

- Escrito D32-2408 No. 01H
- Escrito D32-2408 No. 02H
- Escrito M32-2408 No. 01H (Escrito M32)

The proposed action is the approval of the APDs by the BLM-FFO, located in Farmington, New Mexico.

Each of the proposed wells would drill to BLM-FFO-managed Basin Mancos Gas minerals associated with lease NMNM 118133. Each well would be permitted under an approved APD issued by the BLM-FFO.

The proposed project areas would be located on New Mexico State (State) surface; a Surface Owner Agreement (SOA) would be issued to address permitting on State land.

The proposed Escrito D32-2408 Nos. 01H and 02H wells would be twinned with one another; these proposed projects will be collectively referred to as the "Escrito D32" for the purposes of this document. The proposed Escrito D32 project would involve the horizontal drilling, possible production, and final abandonment of the two wells and the construction, usage, and reclamation of a 6.1-acre well pad (including construction zone), 389-foot-long access road, and 42-foot-long pipeline corridor.

The proposed Escrito M32 project would involve the horizontal drilling, possible production, and final abandonment of the Escrito M32 well and the construction, usage, and reclamation of a 5.7-acre well pad (including construction zone), 1,433-foot-long access road, and pipeline corridor (which would travel parallel to the proposed access road). One action alternative was identified for the Escrito M32 project. This alternative will be analyzed in this Environmental Assessment (EA).

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 San Juan County, New Mexico. The proposed project areas are approximately 34 miles southeast of Bloomfield, 1.5 miles east of Nageezi, and 1.5 miles southwest of Blanco Wash (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 develop their mineral lease.

The need for the proposed action is established by the BLM's responsibility under the Mineral Leasing Act of 1920, as amended (MLA; 30 U.S. Code [USC] 181 et seq.), which authorizes the BLM to permit the development of leases associated with mineral deposits (including oil, gas, and other hydrocarbons). 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. It is the policy of the BLM, as derived from several laws, including the MLA, to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs.

1.3. Decision to be Made

The BLM-FFO will decide whether or not to issue the APDs 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 with design features as submitted
- To approve the APDs with additional mitigation added
- To analyze the effects of the proposed action in an EIS
- To deny the APDs

1.4. Conformance with Applicable Land Use Plan(s)

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

Specifically, the proposed action 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)

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.

The proposed Escrito M32 access road/pipeline corridor would cross two ephemeral, USGS watercourses. 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).

The following on-site meetings were held for the proposed projects:

- Escrito D32: November 26, 2013 (attended by Encana, BLM-FFO representatives, and an environmental consultant [Nelson Consulting, Inc. (NCI)])
- Escrito M32:
    - November 26, 2013 (attended by Encana, BLM-FFO representatives, and NCI)
    - January 2, 2014 (attended by Encana, a BLM-FFO representative, a State representative, and NCI)

The Nageezi Chapter House of the Navajo Nation was invited to the on-site meetings by the BLM-FFO; no members of the Navajo Nation attended. 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. An BLM-FFO Interdisciplinary Team meeting was held for both of the proposed projects on December 2, 2013, to discuss the proposed action. At the aforementioned meetings, potential issues of concern were identified by the BLM-FFO, State, 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?
- 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): Aztec gilia (*Aliciella formosa*), Brack's fishhook cactus (*Sclerocactus cloveriae* var. *brackii*), Bendire's thrasher (*Toxostoma bendirei*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), and pinyon jay (*Gymnorhinus cyanocephalus*)?

- How would surface-disturbing activities associated with construction of the proposed projects impact cultural resources?

- 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 San Juan 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 (refer to Biological Survey Report [BSR] in Appendix B). 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:

- Escrito D32: La Plata Archaeological Consultants [LAC] Report No. 2013-7bb (LAC 2013a; BLM Report No. 2014[II]002F)

- Escrito M32: LAC Report No. 2013-7dd (LAC 2013b; BLM Report No. 2014[II]003F)

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 associated with Encana's proposed Escrito D32 and Escrito M32 projects. The proposed projects would include the drilling, production, and final abandonment of three oil and natural gas wells and the construction, use, and reclamation of two associated well pads (with construction zones), two associated access roads, and two associated pipeline corridors.

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 issuance date of the APD or drill rig scheduling.

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

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 Crow Mesa West, New Mexico, 7.5-minute USGS quadrangle (Figure A.2) and the 2011 San Juan County National Agriculture Imagery Program aerial photograph (Figure A.3).

The proposed project areas are located on State surface within the San Juan Basin in San Juan County, New Mexico. The proposed project areas are approximately 34 miles southeast of Bloomfield, 1.5 miles east of Nageezi, and 1.5 miles southwest of Blanco Wash. The proposed Escrito M32 well pad is approximately 0.6 mile south of the proposed Escrito D32 well pad.

The general region surrounding the proposed project areas is characterized by low, rolling hills; broad, flat highlands; and distant mesas. The elevation within the proposed project areas ranges from 6,900 to 6,950 feet above mean sea level (AMSL).

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

Table 1. Legal Land Description for Escrito Project Features

Project Feature	Legal Location		
	Quarter-Quarter	Section	Township & Range*
Escrito M32			
Well Pad and Construction Zone	southeastern ¼ of southeastern ¼	31	T24N, R8W
	southwestern ¼ of southwestern ¼	32	
Access Road	western ½ of southwestern ¼		
Pipeline Corridor			
Escrito D32			
Well Pad and Construction Zone	western ½ of northwestern ¼	32	T24N, R8W
Access Road	northwestern ¼ of northwestern ¼		
	northeastern ¼ of northeastern ¼	31	
Pipeline Corridor	northwestern ¼ of northwestern ¼	32	
*T: Township, R: Range, N: North, W: West			

U.S. Highway 550 and existing and proposed oil and gas lease roads, well pads, and pipeline tie corridors are in the general vicinity of the proposed project areas.

Escrito D32

The proposed Escrito D32 project area is located on gently rolling terrain with a gentle slope to the northwest. The elevation of the proposed project area ranges from approximately 6,940 to 6,950 feet AMSL.

There is an existing access road immediately northeast of the proposed well pad/construction zone.

Escrito M32

The proposed Escrito M32 project area is located on rolling terrain with a moderate slope to the southwest. The elevation of the proposed project area ranges from approximately 6,900 to 6,940 feet AMSL. Two USGS, ephemeral drainages are crossed by the proposed access road/pipeline corridor. One additional erosional, ephemeral drainage is located within the central portion of the proposed well pad.

There is an existing access road and pipeline corridor approximately 150 feet south of the proposed well pad. Encana's Escrito L32-2408 No. 01H (Escrito L32) well pad, access road, and pipeline corridor (permitted but not yet constructed) are located at the northern end of the proposed Escrito M32 access road/pipeline corridor.

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 on file at the BLM-FFO. The plats (Appendix C) 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). *The Gold Book* was developed to assist operators by providing information on the requirements for obtaining permit approval and conducting environmentally responsible oil and gas operations on federal lands and on non-federal surface over federal minerals.

Because the proposed project areas are located on State surface, additional State stipulations could apply to the proposed projects. SOAs would be developed for the proposed projects.

Design Features and Best Management Practices

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

Control of Waste

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

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

Should any active raptor nests be observed within 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.

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

No more than the amount of pipeline trench than can be worked on in one day would be open at any given time. 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 the proposed pipeline 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 the 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 trenches.

Protection of Water Resources

Two ephemeral, USGS watercourses are crossed by the proposed Escrito M32-2408 access road/pipeline corridor. One of these watercourses is located immediately adjacent to the proposed Escrito M32-2408 well pad. Encana would avoid this watercourse during the construction of the proposed well pad; no fill would be placed within the watercourse.

A closed-loop system would be used on both proposed well pads. “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 stockpile 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

Proposed project phases would be similar for the proposed Escrito D32 and M32 projects. The general phases described below would apply to each individual project. Where differences between the projects would exist, these differences are specified at the end of the appropriate section.

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

Construction of Access Road and Well Pad

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.

A 50-foot-wide construction zone would surround the well pad. The well pad construction zone could be limited in areas if specified by COAs attached to the approved APDs. The size of the proposed well pads is slightly larger than typical well pads in the BLM-FFO area because the equipment (such as tanks) associated with the new hydraulic fracturing design requires a larger area.

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). 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".

<u>Escrito D32</u>
The proposed access road would be 389 feet long.

The proposed well pad would measure 530 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 5.1 feet on the northeastern corner (corner 3). The maximum fill would be 4.5 feet on the western side (between corners 2 and 6).

Escrito M32
The proposed access road would be 1,443 feet long.

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 4.3 feet on the southern corner (corner 5). The maximum fill would be 6.2 feet on the northern corner (corner 2).

Per an agreement with the grazing allottee, Encana would obtain additional fill, if needed, from a nearby, silted-up stock pond.

Drilling and Completion

Drilling
Once well pad and access road construction is completed, a drilling rig would be transported to the well pad and assembled. Drilling activities would take place around the clock for approximately two to three weeks per well; during this phase, there would be constant onsite supervision. During drilling, the following equipment would be on site:

- Drilling rig
- Stockpiles of drill pipe and casing
- Closed-loop system for collection cuttings and fluid
- Above-ground tanks for collecting cuttings and fluid
- Mud shakers to separate cuttings from fluid
- Generators to provide power to the drill rig
- Light towers
- Toilet facilities
- Trash containers
- 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.

Completion

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.

Construction of Pipeline Tie

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”.

Interim Reclamation

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).

In areas that would be reclaimed, slopes would be re-contoured to pre-construction topographical contours, if possible. Encana would diminish the evidence of cuts, fills, and flat well pad surfaces. Water diversions (e.g., culverts, water bars, silt traps, and ditches), if needed, would be installed at this time. After the proposed pipeline corridors have been recontoured, permanent erosion-control measures, such as waterbars, would be installed within the corridors, where needed and as described in “Design Features and Best Management Practices”.

Reclaimed areas would be seeded using species from the BLM-FFO, weed-free Sagebrush-Grass Community Seed Mixture, unless the State specifies otherwise.

<u>Escrito D32</u>

Along the proposed access road, 24-inch-diameter culverts would be installed as needed.

Within the proposed well pad construction zone, the following drainage diversions would be established:

- One diversion would divert water from the northeastern corner (corner 3) to the west (toward corner 2)
- One diversion would divert water from the northeastern corner (corner 3) to the south. The diversion would enter a proposed silt trap along the eastern side of the well pad, and then the diversion would continue southward. The diversion would round the southeastern corner (corner 5) and continue westward.

Escrito M32

The proposed access road would cross two ephemeral drainages. The drainage furthest to the north would be crossed via a low-water crossing. Pit run would be placed at the bottom of the low-water crossing. Within the drainage nearest the proposed well pad, a 36-inch-diameter culvert would be installed beneath the proposed access road. Additional culverts would be installed as needed along the proposed access road.

Within the proposed well pad construction zone, a drainage diversion would be established to divert water from the southern corner (corner 5) to the eastern corner (corner 3).

Production

The production phase of wells varies; the lifetime is anticipated to be 30 to 50 years. The installation of production equipment would take approximately three to four weeks 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

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

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

If the State 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. The goal of final reclamation would be to return the disturbed areas associated with the proposed project to pre-construction conditions, if possible, by diminishing the evidence of cuts, fills, and flat well pad surfaces. Disturbed areas would be re-contoured to pre-construction topographical contours, covered with salvaged topsoil, and seeded. Reclaimed areas would be seeded using the BLM-FFO, weed-free Sagebrush-Grass Community Seed Mixture, unless the State requests otherwise. Erosion control measures, if needed, would be installed at this time.

2.1.3. Proposed Surface Disturbance

New surface disturbance associated with the proposed projects would total 14.0 acres. Of this, 2.9 acres would remain disturbed (barren and level) for the life of the proposed projects, and 11.1 acres would be reclaimed during interim reclamation. This disturbance is summarized in the below table.

Table 3. Surface Disturbance Associated with Proposed Projects

Feature	Total Disturbance (acres)	New Surface Disturbance (acres)	Portion of New Surface Disturbance Reclaimed during Interim Reclamation (acres)	New Surface Disturbance Remaining Disturbed (Barren and Level) for the Life of Proposed Project (acres)
Escrito D32				
Access Road	0.3	0.3	0.2	0.1
Well Pad	4.0	4.0	2.6	1.4
Well Pad Construction Zone	2.1	2.1	2.1	-
Pipeline Corridor	<0.1	<0.1	<0.1	-
Total	**6.4**	**6.4**	**4.9**	**1.5**
Escrito M32				
Access Road	1.0	1.0	0.5	0.5
Well Pad	3.7	3.7	2.8	0.9
Well Pad Construction Zone	2.0	2.0	2.0	-
Pipeline Corridor	1.4	0.9	0.9	-
Total	**8.1**	**7.6**	**6.2**	**1.4**
Total	**14.5**	**14.0**	**11.1**	**2.9**

Escrito D32

New disturbance associated with the proposed Escrito D32 project would be 6.4 acres. Of this, 1.5 acres would remain disturbed (barren and level) for the life of the proposed project, and 4.9 acres would be reclaimed during interim reclamation. Project facilities are described further below:

- Access Road: The proposed access road would be 30 feet in width and 389 feet in length (0.3 acre).

    - The 14-foot-wide running surface of the road and the bottoms of the bar ditches alongside the road (approximately 0.1 acre, total) would remain disturbed for the lifetime of the project. No reclamation would occur within these areas during interim reclamation.
    - The remainder of the access road corridor (0.2 acre) would be reclaimed during interim reclamation.
- Well Pad: The proposed well pad would measure 430 by 400 feet (4.0 acres).
    - Approximately 1.4 acres within the proposed well pad would be used for facilities and daily activities; within this area, no reclamation would occur during interim reclamation.
    - The remainder of the well pad (2.6 acres) would be reclaimed during interim reclamation.
- Construction Zone: A 50-foot-wide (2.1-acre) construction zone would surround the well pad. Less than 0.1 acre would overlap the proposed access road. Therefore, new disturbance resulting from the construction zone would be 2.1 acres. The construction zone would be reclaimed during interim reclamation.
- Pipeline Tie: The proposed pipeline tie corridor would be 42 feet long and 40 feet wide (less than 0.1 acre). All new surface disturbance associated with the proposed pipeline tie corridor would be reclaimed during interim reclamation.

Escrito M32

New disturbance associated with the proposed Escrito M32 project would be 7.6 acres. Of this, 1.4 acres would remain disturbed (barren and level) for the life of the proposed project, and 6.2 acres would be reclaimed during interim reclamation. Project facilities are described further below:

- Access Road: The proposed access road would be 30 feet in width and 1,443 feet in length (1.0 acre).
    - The 14-foot-wide running surface of the road and the bottoms of the bar ditches alongside the road (approximately 0.5 acre, total) would remain disturbed for the lifetime of the project. No reclamation would occur within these areas during interim reclamation.
    - The remainder of the access road corridor (0.5 acre) would be reclaimed during interim reclamation.
- Well Pad: The proposed well pad would measure 400 by 400 feet (3.7 acres).
    - Approximately 0.9 acre within the proposed well pad would be used for facilities and daily activities; within this area, no reclamation would occur during interim reclamation.
    - The remainder of the well pad (2.8 acres) would be reclaimed during interim reclamation.
- Construction Zone: A 50-foot-wide (2.0-acre) construction zone would surround the well pad. Less than 0.1 acre would overlap the proposed access road. Therefore, new disturbance resulting from the construction zone would be 2.0 acres. The construction zone would be reclaimed during interim reclamation.
- Pipeline Tie: The proposed pipeline tie corridor would be 1,482 feet long and 40 feet wide (1.4 acres). The entirety of the corridor length would travel adjacent to the proposed access road. The proposed pipeline tie centerline would be located 20 feet from the access road centerline. Because 15 feet of the pipeline corridor width would overlap the access road corridor, the new disturbance width associated with the pipeline corridor would be 25 feet. The new surface disturbance associated with this portion of the pipeline corridor would be 0.9 acre.

  All new surface disturbance associated with the proposed pipeline tie corridor would be reclaimed during interim reclamation.

2.2. No Action

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

2.3. Alternatives Analyzed in Detail

One action alternative was identified for the projects. Under this alternative, referred to as the “alternative Escrito M32,” the Escrito M32 access road would follow a different route than under the proposed Escrito M32 project. The alternative Escrito M32 access road would travel southward (across BLM-FFO and State surface), rather than northeastward (across State surface) from the proposed Escrito M32 well pad. The alternative Escrito M32 access road would not parallel the Escrito M32 pipeline corridor. The BLM portion of the alternative access road would be permitted under a BLM Right-of-Way (ROW) Grant.

A plat showing the alternative Escrito M32 road route is provided in Appendix C.3. The alternative road route is shown on Figures A.2 and A.3 (Appendix A). Photographs of the alternative road route are provided in Appendix D.

Information provided in Section 2.1 (Proposed Action) would apply to the alternative Escrito M32 project, with the following exceptions:

Location of Alternative Escrito M32 Project Feature

A portion of the alternative Escrito M32 access road would be located on BLM-FFO surface. The alternative access road would be located within the southeastern quarter of the southeastern quarter of Section 31, Township 24 North, Range 8 West (State surface) and the northeastern quarter of the northeastern quarter of Section 6, Township 23 North, Range 8 West (BLM-FFO surface).

No USGS watercourses would be crossed by the alternative access road.

The alternative access road would cross a fenceline at the BLM-FFO/State boundary. The alternative access road would also cross a newly constructed Mid-America Pipeline Company LLC (MAPCO) pipeline corridor.

Alternative Escrito M32 Project Phases

Encana would need to drive on Navajo Nation roads to reach the start of the alternative Escrito M32 access road. This could require Navajo Nation permitting.

The alternative access road would be 326 feet long.

The alternative access road would not cross any ephemeral drainages. Therefore, the site-specific culvert and low-water crossing described for the proposed Escrito M32 access road would not apply to the alternative project.

Where the alternative access road would cross a fenceline, the fence would be cut and braced. A gate and cattleguard would be installed.

Where the alternative access road would cross the MAPCO pipeline, padding would be used over the pipeline.

Alternative Escrito M32 Surface Disturbance

Under the alternative Escrito M32 project, the total disturbance associated with the Escrito D32 and Escrito M32 projects would be 13.7 acres (as opposed to 14.0 acres under the proposed project). Of this, 2.5 acres would remain disturbed (barren and level) for the life of the alternative project (as opposed to 2.9 acres under the proposed project). The remaining 11.2 acres would be reclaimed during interim reclamation.

New disturbance associated with the alternative Escrito M32 project would be 7.3 acres (0.1 acre on BLM-FFO surface, 7.2 acres on State surface). Of this, 1.0 acre would remain disturbed (barren and level) for the life of the alternative project. The remaining 6.3 acres would be reclaimed during interim reclamation.

The surface disturbance acreage differences between the proposed and alternative projects are summarized in the below table.

Table 4. Surface Disturbance Differences Associated with Proposed and Alternative Escrito M32 Projects

Feature	Total Disturbance (acres)		New Surface Disturbance (acres)		Portion of New Surface Disturbance Reclaimed during Interim Reclamation (acres)		New Surface Disturbance Remaining Disturbed (Barren and Level) for the Life of Proposed Project (acres)	
	Proposed Project	Alter-native Project	Proposed Project	Alter-native Project	Proposed Project	Alter-native Project	Proposed Project	Alter-native Project
Access Road	1.0	0.2	1.0	0.2	0.5	0.1	0.5	0.1
Well Pad	3.7	3.7	3.7	3.7	2.8	2.8	0.9	0.9
Well Pad Construction Zone	2.0	2.0	2.0	2.0	2.0	2.0	-	-
Pipeline Corridor	1.4	1.4	0.9	1.4	0.9	1.4	-	-
Total	**8.1**	**7.3**	**7.6**	**7.3**	**6.2**	**6.3**	**1.4**	**1.0**

The differences in surface disturbance between the proposed and alternative Escrito M32 projects are as follows:

- The alternative Escrito M32 access road would be 326 feet long (81 feet on BLM-FFO land, 245 feet on State land; as opposed to a 1,443-foot-long road across State surface). New disturbance associated with the access road would be 0.2 acre (0.1 acre on BLM-FFO land, 0.1 acre on State land; as opposed to 1.0 acre entirely on State surface).
    - The 14-foot-wide running surface of the road and the bottoms of the bar ditches alongside the road (approximately 0.1 acre, total) would remain disturbed for the lifetime of the project. No reclamation would occur within these areas during interim reclamation.
    - The remainder of the access road corridor (0.1 acre) would be reclaimed during interim reclamation.
- The route of the Escrito M32 pipeline corridor would be the same under the proposed and alternative projects. However, under the alternative Escrito M32 project, the Escrito M32 access road would not parallel the pipeline corridor. Therefore, the pipeline corridor would travel cross-country. The pipeline corridor's new disturbance width would be 40 feet (as opposed to 25 feet). Total new disturbance resulting from the pipeline corridor would be 1.4 acres (as opposed to 0.9 acre).

2.4. 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 well pad locations were identified for the Escrito D32 or Escrito M32 projects that would result in less surface disturbance than the proposed well pad locations. Specifically, the drilling of the Escrito M32 well from the Escrito L32 well pad (permitted, not yet constructed) was considered. Drilling from the Escrito L32 well pad to the proposed Escrito M32 bottom hole would require a 1,500-foot-long reach. Currently, Encana's technical limit (due to torque, drag, and other operational and production considerations) to achieve tolerable resource recovery is a 1,100-foot-long reach. Therefore, a 1,500-foot-long reach would be unfeasible.

A different Escrito M32 access road route was originally considered. The originally proposed Escrito M32 access road would have traveled to the Escrito M32 well pad from Elm Ridge Exploration Company's shut-in New Mexico State No. 2 well pad. This road would have been 782 feet long (0.5 acre). All other features associated with the proposed Escrito M32 project would have remained the same; the Escrito M32 pipeline corridor would have therefore traveled cross-country. This alternative is not being analyzed because there would be no benefit to this access road route as compared to the two analyzed Escrito M32 access road routes. This access road route would not parallel the Escrito M32 pipeline corridor (as opposed to the proposed M32 project) and would be longer than the alternative Escrito M32 road route.

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

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

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

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

Air Quality

Criteria Air Pollutants

The Air Resource Technical Report describes the types of data used in the description of the existing conditions of criteria pollutants, describes how the criteria pollutants are related to the activities involved in oil and gas development, and provides a table of current national and state standards (BLM 2013a). The EPA Green Book web page reports that all counties in the BLM-FFO analysis area, including San Juan, McKinley, Rio Arriba, and Sandoval Counties in New Mexico and La Plata County in Colorado, are in attainment of all NAAQS as defined by the CAA (EPA 2012). In addition, the area does not violate any New Mexico Ambient Air Quality Standards (NMAAQS). The current criteria pollutant “design concentrations” in the analysis area are described below. Design Concentrations are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. Table 5 shows monitored design values for O_3 in recent years for each of the three San Juan County O_3-monitoring stations.

Table 5. 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 6 summarizes monitored design values for other criteria pollutants in San Juan County.

Table 6. Criteria Pollutant Design Value Concentrations monitored in San Juan County

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

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

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

Hazardous Air Pollutants

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

Climate

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

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

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

Direct and Indirect Impacts

Table 8 shows estimated emissions from one proposed horizontal oil well for criteria pollutants, volatile organic compounds (VOCs), and GHGs. For comparison, Table 9 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 8. Criteria Pollutant and VOC Emissions Estimated for Construction of One Horizontal Oil Well; Average 25 Days to Drill and Complete

Activity	NOx*	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2
One time operations (tons)*								
Construction	5.5	1.5	0.5	2.5	0.25	0.1	0.007	598.85
Completion	0.5	0.1	0.03	0.025	0.025	-	-	55.00
Interim Reclamation	0.006	0.006	0.006	0.001	-	0.003	-	1.24
Final Reclamation	0.006	0.006	0.006	0.001	-	0.004	-	1.66

Activity	NOx*	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2
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 9. 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 10 displays the percent increase in total emissions expected in the analysis area as a result of constructing and operating one horizontal oil well.

Table 10. 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 2013a).

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

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

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

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

3.1.3. Impacts from the Alternative Escrito M32 Action

It is anticipated that direct, indirect, and cumulative impacts would be similar under the proposed action and the alternative action.

3.2. Groundwater Resources

3.2.1. Affected Environment

Within a 1-mile radius of the proposed well pads, there are two recorded water wells. These water wells are SJ02686 (depth-to-groundwater 690 feet) and RG43604 (no depth-to-groundwater data available; New Mexico Office of the State Engineer 2011).

Under the alternative Escrito M32 project, the proposed well pad locations would not change. Therefore, there would be no difference in depth to groundwater for the proposed and alternative projects.

3.2.2. 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.

3.2.3. Impacts from the Alternative Escrito M32 Action

It is anticipated that direct, indirect, and cumulative impacts would be similar under the proposed action and the alternative action.

3.3. Upland Vegetation

3.3.1. Affected Environment

The proposed and alternative 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 (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus* spp.), winterfat (*Krascheninnikovia lanata*), shadscale saltbush (*Atriplex confertifolia*), and greasewood (*Sarcobatus vermiculatus*); and grasslands of blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), and needleandthread grass (*Hesperostipa comata)*. 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).

Proposed Project Areas

The proposed Escrito D32 project area is characterized by a sagebrush shrubland vegetation community. The proposed Escrito M32 project area is characterized by a sagebrush shrubland vegetation community with scattered juniper trees. The vegetation communities are each described in detail in the BSR (Appendix B).

Alternative Escrito M32 Project Area

The vegetation community found within the alternative M32 access road is similar to that described for the proposed Escrito M32 project area.

3.3.2. Impacts from the Proposed Action

Direct and Indirect Impacts

During the construction phase of the proposed project, all vegetation within the 14.0 acres associated with the proposed project areas would be cleared. This would include the removal of 10 to 15 trees. During interim reclamation, approximately 11.1 acres of the proposed project areas would be reclaimed. The remaining 2.9 acres would remain as compacted, barren surface for the life of the proposed wells. During final reclamation, Encana would reclaim all portions of the proposed project areas that were not reclaimed during interim reclamation.

During interim and final reclamation, the BLM Sagebrush-Grass Community Seed Mixture would be utilized (unless the State requests otherwise). 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 immediately northeast of the proposed Escrito D32 well pad/construction zone. The proposed D32 access road and pipeline corridor would end at this road.
- There is an existing two-track road at the northern end of the proposed Escrito M32 access road/pipeline corridor. This two-track road will be improved to become the Escrito L32 access road (permitted, not yet constructed). The Escrito L32 pipeline corridor will parallel a portion of this road.
- The proposed Escrito L32 well pad (permitted, not constructed) will be located immediately west of the northern end of the proposed Escrito M32 access road/pipeline corridor.
- There is an existing access road and newly constructed MAPCO pipeline corridor approximately 150 feet south of the proposed Escrito M32 well pad.

- Active wildlife and livestock grazing occurs in the spatial analysis area. The spatial analysis area is within a grazing allotment (Nageezi, Allotment No. 5085), which is permitted for year-round grazing by six head of cattle.

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

3.3.3. Impacts from the Alternative Escrito M32 Action

Direct and Indirect Impacts

Direct and indirect impacts would be similar under the proposed action and the alternative action, with the following exception: under the alternative Escrito M32 project, there would be 13.7 acres of new disturbance to upland vegetation. During interim reclamation, approximately 11.2 acres of the proposed project areas would be reclaimed. The remaining 2.5 acres would remain as compacted, barren surface for the life of the proposed wells. Therefore, there would be 0.3 fewer acres of overall vegetative disturbance and 0.4 fewer acres of long-term disturbance under the alternative Escrito M32 project as compared to the proposed project.

Cumulative Impacts

The spatial analysis area for the alternative Escrito M32 project would be similar to the spatial analysis area for the proposed action, with the following exception: the spatial analysis area for the alternative Escrito M32 project would also include lands within and adjacent to the alternative Escrito M32 access road. The existing and reasonably foreseeable disturbances within this spatial analysis area include all of those listed for the proposed project, as well as the following:

- The southern end of the alternative Escrito M32 access road would cross the newly constructed MAPCO pipeline corridor and connect with the existing access road south of the proposed Escrito M32 well pad.

- Active livestock grazing within the spatial analysis area would include grazing associated with grazing allotment 5083, Largo Community. The southern portion of the alternative Escrito M32 access road is within this grazing allotment, which is permitted for year-round grazing by 145 head of cattle and 596 sheep.

Cumulative impacts would be similar under the proposed action and the alternative action, with the exception of the differences between the proposed action and alternative action's Direct and Indirect Impacts, and the disturbances listed above.

3.4. Wildlife

3.4.1. Affected Environment

General Wildlife

The vegetation communities found within the proposed and alternative 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 2003a, 2-24). A discussion of wildlife identified within the proposed project areas is provided in the BSR (Appendix B). Based on the available habitat, the potential for wildlife species to occur within the alternative Escrito M32 project area would be similar.

Migratory Birds

EO 13186, dated January 17, 2001, calls for increased efforts to more fully implement the Migratory Bird Treaty Act of 1918. In keeping with this mandate, the BLM-FFO has issued an interim policy to minimize unintentional take, as defined by the EO, and to better optimize migratory bird efforts related to BLM-FFO activities. In keeping with this

policy, a list of priority birds of conservation concern which occur in ecological regions similar to the proposed project area was compiled through a review of existing bird conservation plans, including the following:

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

The selected species have a known distribution in the BLM-FFO area and may be affected by various types of perturbations. These species and an evaluation of their potential to occur within the proposed project areas are discussed in the BSR (Appendix B); a list of species identified within the proposed project areas during the biological surveys is also provided. Based on the available habitat, the potential for bird species to occur within the alternative Escrito M32 project area would be similar.

3.4.2. 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.

During the construction phase of the proposed projects, all vegetation, including 10 to 15 trees, within the 14.0 acres associated with the proposed project areas would be cleared. Approximately 2.9 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 3.3 (Upland Vegetation). If interim and final reclamation are successful, a sagebrush shrubland community would become re-established within the proposed project areas. However, as discussed in Section 3.3, 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 2,904 linear feet (0.6 mile) of initial habitat fragmentation resulting from the proposed project; this fragmentation would exist until interim reclamation is deemed successful. Initial habitat fragmentation would result from the following:

- Proposed Escrito D32 access road: 389 feet
- Proposed Escrito D32 well pad/construction zone: 530 feet (along longest side)
- Proposed Escrito D32 pipeline corridor: 42 feet
- Proposed Escrito M32 access road/pipeline corridor: 1,443 feet
- Proposed Escrito M32 well pad/construction zone: 500 feet (along longest side)

For the long term, the proposed access roads and the working areas of the proposed well pads would result in 2,782 linear feet (0.5 mile) of long-term habitat fragmentation.

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.

Migratory Birds

Due to the mobility of adult birds, they would be unlikely to be directly harmed by the proposed projects. If the vegetation-clearing phase of construction for either proposed project is scheduled to occur during migratory bird breeding season, it is possible (if these nests are not identified and protected by the operator prior to vegetation clearing) that nests, eggs, or young birds could be directly harmed. 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.

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 – 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.

Cumulative Impacts

The spatial analysis area for wildlife includes the proposed project areas and an approximately 2-mile radius around the proposed project 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:

- 21 active oil and/or gas wells and associated well pads
- 16 inactive oil and/or gas wells and associated well pads (some reclaimed)
- 5 proposed oil and/or gas well pads
- Approximately 6 miles of U.S. Highway 550
- Approximately 1 mile of existing County Roads (including County Roads 7800, 7890, and 7900)
- Approximately 33 miles of BLM roads
- Approximately 1 mile of proposed oil and gas access roads
- Numerous existing and proposed utility ROWs, most of which parallel existing or proposed roads
- Active wildlife and livestock grazing; the spatial analysis area is within grazing allotments Nageezi (Allotment No. 5085, permitted for year-round grazing by six head of cattle) and Largo Community (Allotment No. 5083, permitted for year-round grazing by 145 head of cattle and 596 sheep)

- Scattered residential development

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

3.4.3. Impacts from the Alternative Escrito M32 Action

Direct and Indirect Impacts

Direct and indirect impacts would be similar under the proposed project and the alternative Escrito M32 project, with the following exceptions:

- Under the alternative Escrito M32 project, there would be slightly less vegetation disturbance than under the proposed project. Under the alternative Escrito M32 project, there would be 0.3 fewer acres of direct vegetation removal, and 0.4 fewer acres of long-term vegetation removal than under the proposed action. Therefore, there would be slightly less habitat disturbance under the alternative Escrito M32 project than under the proposed project.

- Under the alternative Escrito M32 project, there would be slightly more initial habitat fragmentation than under the proposed project, but long-term habitat fragmentation would be less. Because the 326-foot-long alternative Escrito M32 access road would not parallel the Escrito M32 pipeline corridor, initial fragmentation associated with the alternative Escrito M32 project would be 3,269 feet (0.6 mi; 365 feet longer than the proposed action). Following successful interim reclamation, because the alternative Escrito M32 access road is shorter than the proposed Escrito M32 access road, long-term habitat fragmentation would be 1,165 feet (0.2 mile; 1,617 feet shorter than the proposed project).

Cumulative Impacts

Cumulative impacts would be similar under the proposed and alternative projects, with the exception of the differences in the projects' Direct and Indirect Impacts.

3.5. Special Status Species

3.5.1. Affected Environment

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

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

Based on known range and habitat, several BLM SSS have the potential to occur within the proposed and alternative project areas. These species and their habitat requirements are discussed in detail in the BSR (Appendix B). Potential SSS habitat is similar within the proposed and alternative project areas. The SSS with the potential to occur within the proposed and alternative project areas are as follows:

- Aztec gilia (BLM Sensitive and SMS): within BLM-FFO-designated potential habitat “zone” (BLM 2013b), but only marginal habitat present. No individuals identified during transect surveys of proposed and alternative project areas.
- Brack’s fishhook cactus (BLM Sensitive and SMS): within BLM-FFO-designated potential habitat “zone” (BLM 2013b), but only marginal habitat present. No individuals identified during transect surveys of proposed and alternative project areas.
- Bendire’s thrasher (BLM Sensitive): potential foraging and nesting habitat available.
- Ferruginous hawk (BLM Sensitive and SMS): potential foraging habitat available.
- Golden eagle (BLM SMS): potential foraging habitat available.
- Pinyon jay (BLM Sensitive): potential foraging habitat available.

3.5.2. Impacts from the Proposed Action

Direct and Indirect Impacts

Aztec Gilia and Brack’s Fishhook Cactus

Although the proposed project areas are within the BLM-FFO-designated potential habitat “zone” for these species (BLM 2013b), only marginal habitat for these species is present. Therefore, it is not anticipated that the proposed projects would impact these species.

Bendire’s Thrasher and Pinyon Jay

Impacts to Bendire’s thrashers and pinyon jays would be similar to those described for migratory birds (Section 3.4.2 [Wildlife– Impacts from the Proposed Action – Migratory Birds]).

Ferruginous Hawk and Golden Eagle

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

The clearing of vegetation would result in the removal of foraging habitat and the creation of habitat fragmentation for raptors. In addition, audial and visual disturbances associated with the proposed projects could cause indirect habitat loss. Habitat loss and fragmentation are described in detail in Section 3.4.2 (Wildlife – Impacts from the Proposed Action - Direct and Indirect Impacts).

Cumulative Impacts

Aztec Gilia and Brack’s Fishhook Cactus

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

Bendire’s Thrasher, Pinyon Jay, Ferruginous Hawk, and Golden Eagle

The spatial analysis area for wildlife SSS includes the proposed project areas and an approximately 2-mile radius around the proposed project areas. Within the spatial analysis area, there is existing disturbance. This disturbance is described in detail in Section 3.4.2 (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 3.4.2 [Wildlife - Impacts from the Proposed Action – Cumulative Impacts]).

3.5.3. Impacts from the Alternative Escrito M32 Action

Direct and Indirect Impacts

Direct and indirect impacts would be similar under the proposed action and the alternative action, with the following exceptions: under the alternative Escrito M32 project, there would be fewer acres of vegetative disturbance for wildlife SSS, initial habitat fragmentation for wildlife SSS would be greater, and long-term habitat fragmentation for wildlife SSS would be lesser. These differences are described in detail in Section 3.4.2 (Wildlife – Impacts from the Alternative Escrito M32 Action – Direct and Indirect Impacts).

Cumulative Impacts

Cumulative impacts would be similar under the proposed action and alternative action, with the exception of the differences in the proposed action and alternative action's Direct and Indirect Impacts.

3.6. Cultural Resources

3.6.1. Affected Environment

The proposed and alternative 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.

Proposed Project

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

Escrito D32

The archaeological report is LAC Report No. 2013-7bb (2013a, BLM 2014[II]002F). The Class III inventory resulted in the discovery of one cultural site within the APE. This site is recommended as eligible for nomination to the NRHP (LAC 2013a). No TCPs are known to exist in the APE.

Escrito M32

The archaeological report is LAC Report No. 2013-7dd (2013b, BLM 2014[II]003F). The Class III inventory resulted in the rediscovery of one cultural site within the APE. This site is recommended as eligible for nomination to the NRHP (LAC 2013a). No TCPs are known to exist in the APE.

Alternative Escrito M32 Project

The alternative Escrito M32 project area was culturally surveyed as part of the aforementioned proposed Escrito D32 project and other projects in the surrounding area. One cultural site has been identified within the APE; this cultural site is the same site as discussed above for the proposed Escrito D32 project (LAC 2013a). No TCPs are known to exist in the APE.

3.6.2. 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.

3.6.3. Impacts from the Alternative Escrito M32 Action

It is anticipated that direct, indirect, and cumulative impacts would be similar under the proposed action and alternative action.

3.7. Livestock

3.7.1. Affected Environment

Proposed Project Areas

The proposed project areas are located in the Nageezi Allotment, Allotment Number 5085. The vegetation community within the allotment is primarily sagebrush shrubland. The allotment has a grazing authorization that permits six head of cattle with a year-round grazing period. The term grazing authorization permits the utilization of 72 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 2,897 acres and consists of 100-percent BLM-authorized AUMs. The average rangeland carrying capacity for the allotment is 40 acres per AUM. There are no fences within the proposed project areas. There is a silted-in stock pond approximately 0.2 mile east of the northern terminus of the proposed Escrito M32 access road/pipeline corridor.

Alternative Escrito M32 Project Area

The majority of the alternative Escrito M32 project area would be within the Nageezi Allotment (described above).

The southern portion of the alternative Escrito M32 access road would be on BLM-FFO land within the Largo Community Allotment, Allotment Number 5083. The vegetation communities within the allotment are primarily sagebrush shrubland and piñon-juniper woodland. The allotment has a grazing authorization that permits 145 head of cattle and 596 sheep with a year-round grazing period. The term grazing authorization permits the utilization of 3,046 active AUMs of forage. The allotment is 47,698 acres and consists of 100-percent BLM-authorized AUMs. The average rangeland carrying capacity for the allotment is 16 acres per AUM.

A fence is present along the State/BLM-FFO boundary, between the Nageezi and Largo Community Allotments; this fence crosses the alternative Escrito M32 access road.

3.7.2. Impacts from the Proposed Action

Direct and Indirect Impacts

The proposed projects would result in the surface disturbance of 14.0 acres within the Nageezi Allotment. The estimated short-term impact to range carrying capacity would be a loss of 0.4 AUM (assuming an average rangeland carrying capacity of 40 acres per AUM and a disturbance area of 14.0 acres). After successful interim reclamation, the long-term-loss would be 0.1 AUM (assuming an average rangeland carrying capacity of 40 acres per AUM and a long-term working area of 2.9 acres).

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, fill could be removed from the silted-up stock pond to the east of the proposed Escrito M32 access road/pipeline corridor; the removal of this silt would benefit livestock.

Cumulative Impacts

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

- 9 active oil and/or gas wells and associated well pads
- 4 inactive oil and/or gas wells and associated well pads (some reclaimed)
- 4 proposed oil and/or gas wells and associated well pads, roads, and utility corridors
- 10 miles of BLM roads
- Several existing utility corridors, primarily paralleling roads

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

3.7.3. Impacts from the Alternative Escrito M32 Action

Direct and Indirect Impacts

Impacts would be similar under the proposed action and alternative action, with the following exceptions:

- Surface disturbance within the Nageezi Allotment would be 13.6 acres. The estimated short-term impact to range carrying capacity would be a loss of 0.3 AUM (assuming an average rangeland carrying capacity of 40 acres per AUM and a disturbance area of 13.6 acres). After successful interim reclamation, the long-term-loss would be 0.1 AUM (assuming an average rangeland carrying capacity of 40 acres per AUM and a long-term working area of 2.4 acres).

  Therefore, under the alternative action, surface disturbance within the Nageezi Allotment would be 0.4 fewer acres than under the proposed action. There would be a short-term loss of 0.1 fewer AUMs than under the proposed action. Long-term AUM loss would be similar under the proposed and alternative action.

- The alternative Escrito M32 project would result in the surface disturbance of 0.1 acre within the Largo Community Allotment. The estimated short-term impact to range carrying capacity would be a loss of less than 0.1 AUM (assuming an average rangeland carrying capacity of 16 acres per AUM and a disturbance area of 0.1 acre). After successful interim reclamation, the long-term-loss would also be less than 0.1 AUM (assuming an average rangeland carrying capacity of 40 acres per AUM and a long-term working area of 0.1 acre).

- A fence between the two aforementioned allotments would be cut. As described in Chapter 2, at this crossing the fence would be cut and braced. A gate and cattleguard would be installed. If the fence is not cut properly or the cattleguard/gate are not installed correctly and promptly, containment of livestock would be compromised. This could result in injury to livestock or individuals in the event of a vehicular accident. Indirect impacts could include time spent by the permittee to locate livestock or deal with potential trespass issues regarding the respective livestock owner if the livestock cross allotment boundaries.

Cumulative Impacts

The alternative Escrito M32 project area is within the Nageezi and Largo Community Allotments. Therefore, the spatial analysis area for livestock includes both allotments. The existing and reasonably foreseeable future disturbance within the Nageezi Allotment is listed in Section 3.7.2, above. The following existing and reasonably foreseeable future disturbance is present within the Largo Community Allotment:

- 77 active oil and/or gas wells and associated well pads
- 82 inactive oil and/or gas wells and associated well pads
- 16 proposed oil and/or gas wells and associated well pads, roads, and utility corridors
- Approximately 18 miles of U.S. Highway 550
- Approximately 29 miles of County Roads
- Approximately 99 miles of BLM roads
- Numerous existing utility corridors, primarily paralleling roads
- Scattered residential development

The alternative Escrito M32 project would contribute to cumulative disturbance within both 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
- Steven Merrell, Encana
- Fred Harden, LAC
- Steve Fuller, 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
- Sherrie Landon, Paleontologist and Environmental Protection Specialist, BLM-FFO
- Esther Willetto, Tribal Program Coordinator, BLM-FFO
- Jeff Tafoya, Range Specialist, BLM-FFO
- Mike Flaniken, Environmental Protection Specialist, BLM-FFO

4.3. References

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

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

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

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

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

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

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

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

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

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

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

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

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

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

_____. 2013b. aztec_gilia_habitat (Shapefile of the new Aztec gilia and Brack's fishhook cactus potential habitat "zone"). Provided by the BLM-FFO September 26, 2013.

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

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

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

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

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

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

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

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

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

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

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

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

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

Huse, Hannah, Bradley A. Noisat, and Judith A. Halasi. 1978. The Bisti Star Lake Project: A Sample Survey of Cultural Resources in Northwestern New Mexico. New Mexico Bureau of Land Management Cultural Resources Series 1.

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

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

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

La Plata Archaeological Consultants (LAC). 2013a. A Cultural Resources Survey of Encana Oil and Gas (USA) Inc.'s Escrito D32-2408 Numbers 01H and 02H Dual Well Pad, Access Road, and Pipeline, San Juan County, New Mexico. LAC Report 2013-7bb.

_____. 2013b. A Cultural Resources Survey of Encana Oil and Gas (USA) Inc.'s Escrito M32-2408 Number 01H Well Pad, Access Road, and Pipeline, San Juan County, New Mexico. LAC Report 2013-7dd.

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

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

Natural Resources Conservation Service (NRCS). 2009. Soil Survey of San Juan County, New Mexico: Eastern Part. Web Soil Survey. Available at: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

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

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

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

New Mexico Office of the State Engineer. 2011. GIS shapefile: ose_wells_July2011. http://www.ose.state.nm.us/water_info_data.html.

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

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

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

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

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

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

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

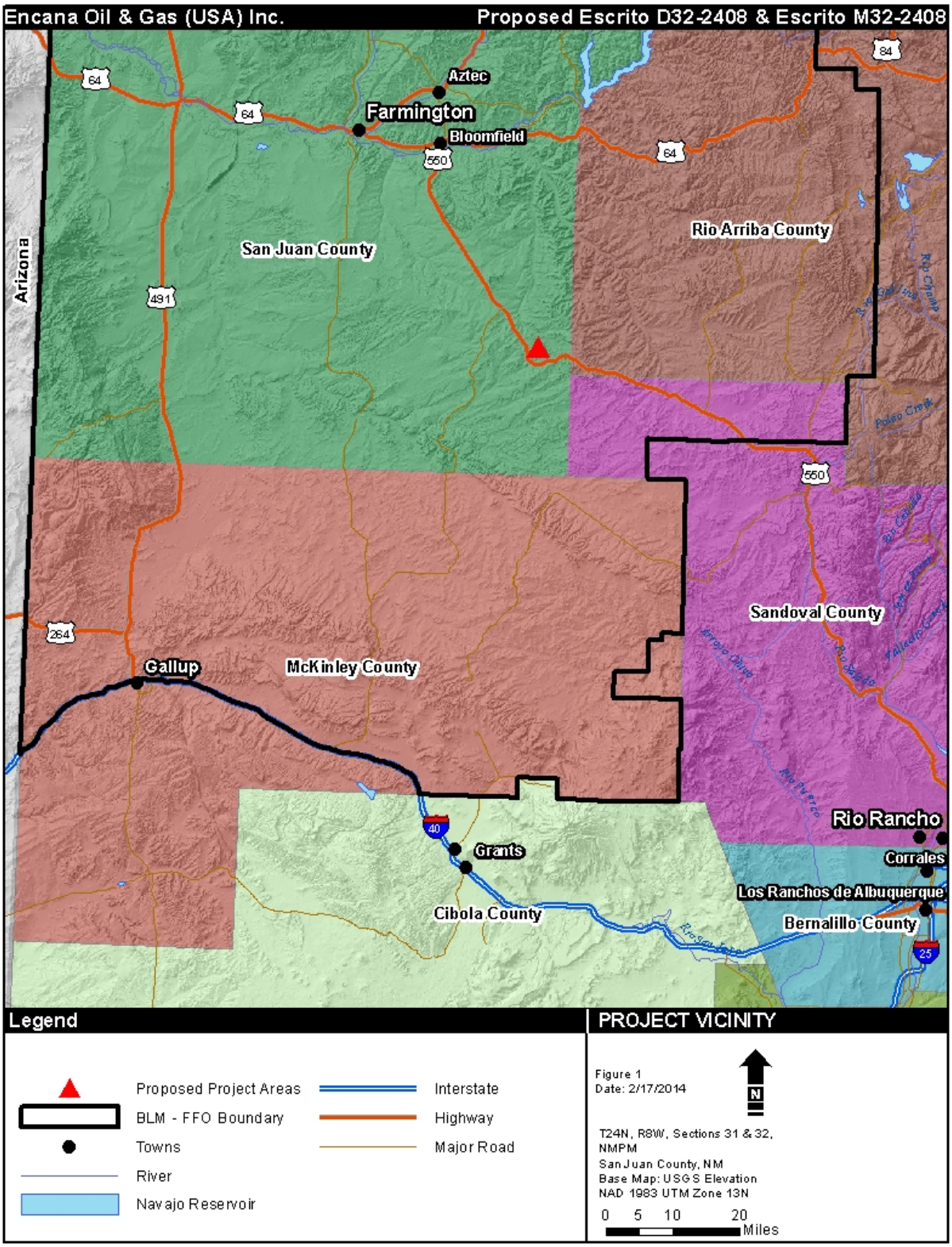
U.S. Geological Survey (USGS). 1979. Notice to Lessees and Operators of Onshore Federal and Indian Oil and Gas Leases (NTL-3A). Reporting of Undesirable Events.

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

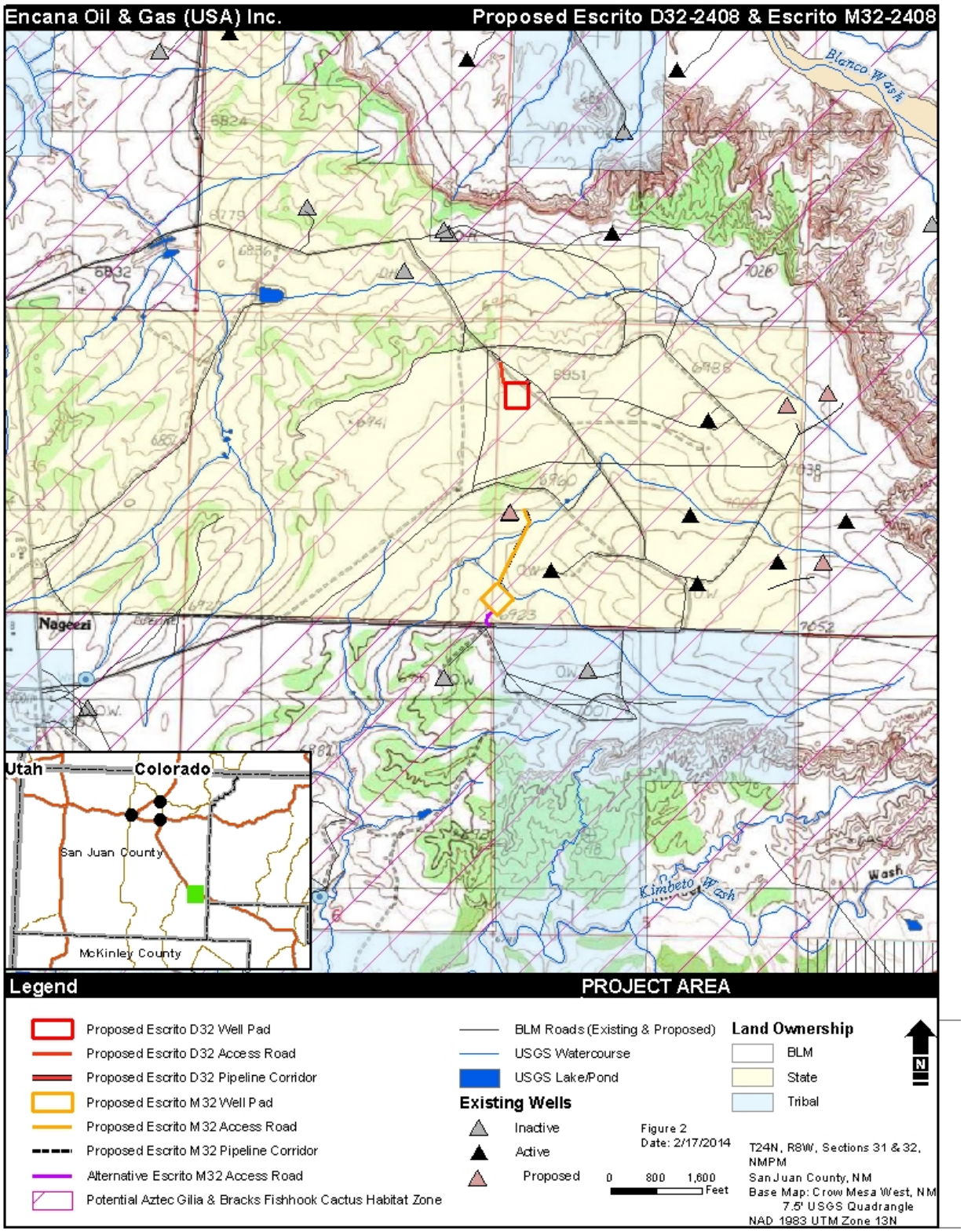
_____. 1974. Navajo Sacred Places. Edited by Clyde Kluckhohn. Garland American Indian Ethnohistory Series, Navajo Indians, 3 Vols. New York, New York: Garland Publishing.

APPENDIX A. MAPS

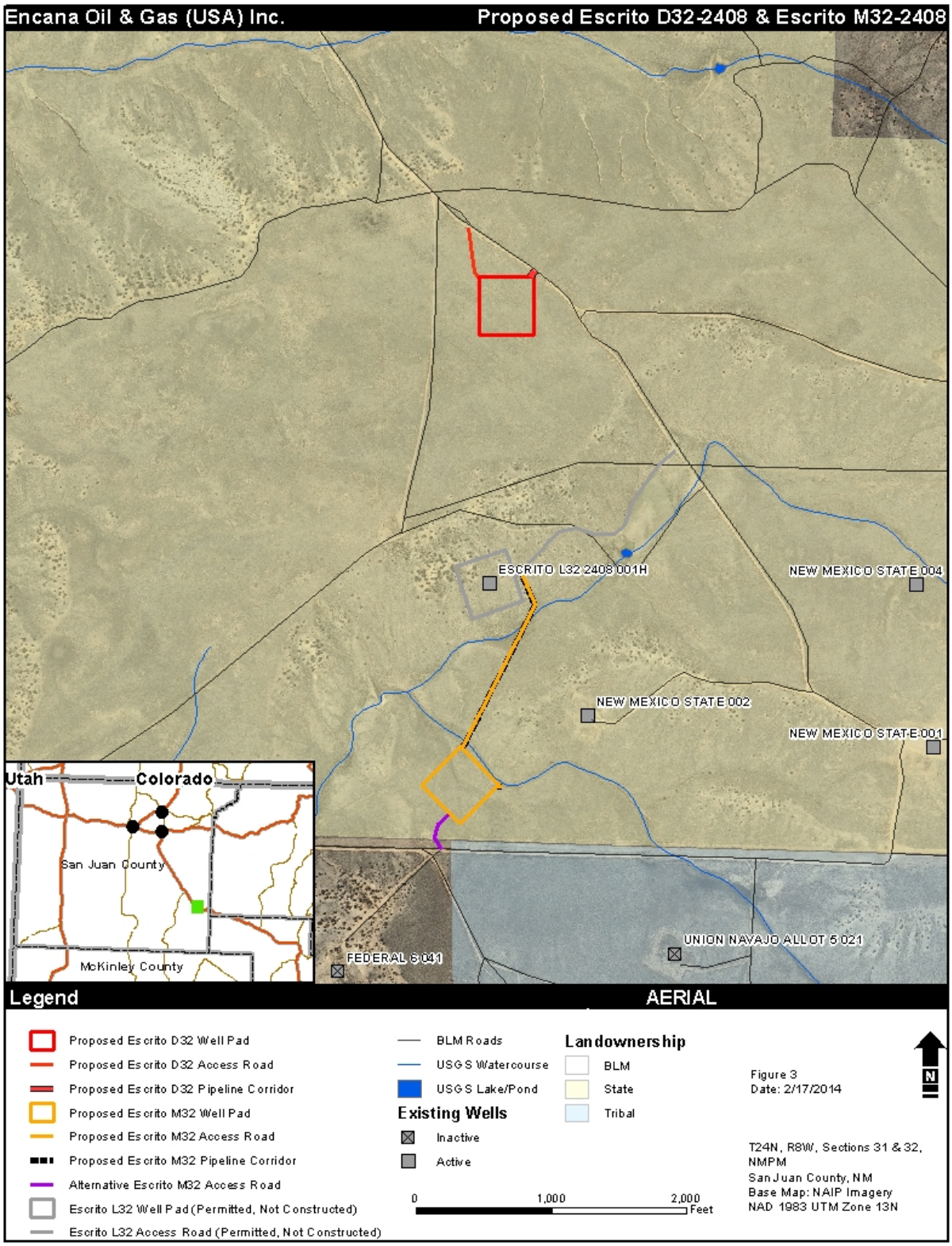
A.1. **Vicinity Map**



A.2. **Project Area Map**



A.3. **Aerial Map**



APPENDIX B. BIOLOGICAL SURVEY REPORT

APPENDIX C. PLATS

C.1. **Proposed Escrito D32**

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
	97232	BASIN MANCOS GAS

[4] Property Code	[5] Property Name	[6] Well Number
	ESCRITO D32-2408	01H

[7] OGRID No.	[8] Operator Name	[9] Elevation
282327	ENCANA OIL & GAS (USA) INC.	6944.9'

[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
D	32	24N	8W		1306'	NORTH	280'	WEST	SAN JUAN

[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
D	31	24N	8W	1	400'	NORTH	330'	WEST	SAN JUAN

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
PROJECT AREA 640.00 ACRES ALL OF SEC. 31			

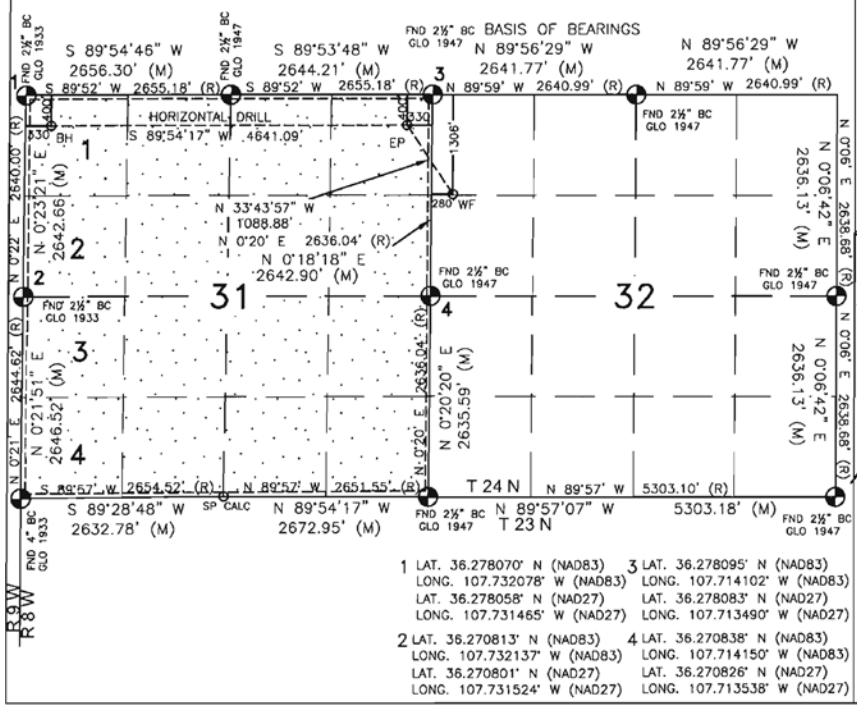
NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

16

BOTTOM HOLE
LAT. 36.276973' N (NAD83)
LONG. 107.730968' W (NAD83)
LAT. 36.276961' N (NAD27)
LONG. 107.730355' W (NAD27)

ENTRY POINT
LAT. 36.276995' N (NAD83)
LONG. 107.715228' W (NAD83)
LAT. 36.276983' N (NAD27)
LONG. 107.714616' W (NAD27)

WELL FLAG
LAT. 36.274508' N (NAD83)
LONG. 107.713178' W (NAD83)
LAT. 36.274496' N (NAD27)
LONG. 107.712566' W (NAD27)



1 LAT. 36.278070' N (NAD83)
LONG. 107.732078' W (NAD83)
LAT. 36.278058' N (NAD27)
LONG. 107.731465' W (NAD27)

2 LAT. 36.270813' N (NAD83)
LONG. 107.732137' W (NAD83)
LAT. 36.270801' N (NAD27)
LONG. 107.731524' W (NAD27)

3 LAT. 36.278095' N (NAD83)
LONG. 107.714102' W (NAD83)
LAT. 36.278083' N (NAD27)
LONG. 107.713490' W (NAD27)

4 LAT. 36.270838' N (NAD83)
LONG. 107.714150' W (NAD83)
LAT. 36.270826' N (NAD27)
LONG. 107.713538' 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.

JULY 31, 2013

Date of Survey

Signature and Seal of Professional Surveyor:

DAVID RUSSELL
NEW MEXICO
10201
REGISTERED PROFESSIONAL LAND SURVEYOR

DAVID RUSSELL

Certificate Number 10201

DISTRICT I
1625 N. French Dr., Hobbs, N.M. 88240
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Form C-102
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Submit one copy to appropriate District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name
	97232	BASIN MANCOS GAS

[4] Property Code	[5] Property Name	[6] Well Number
	ESCRITO D32-2408	02H

[7] OGRID No.	[8] Operator Name	[9] Elevation
282327	ENCANA OIL & GAS (USA) INC.	6944.9'

[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
E	32	24N	8W		1336'	NORTH	280'	WEST	SAN JUAN

[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
E	31	24N	8W	2	1880'	NORTH	330'	WEST	SAN JUAN

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
PROJECT AREA 640.00 ACRES ALL OF SEC. 31			

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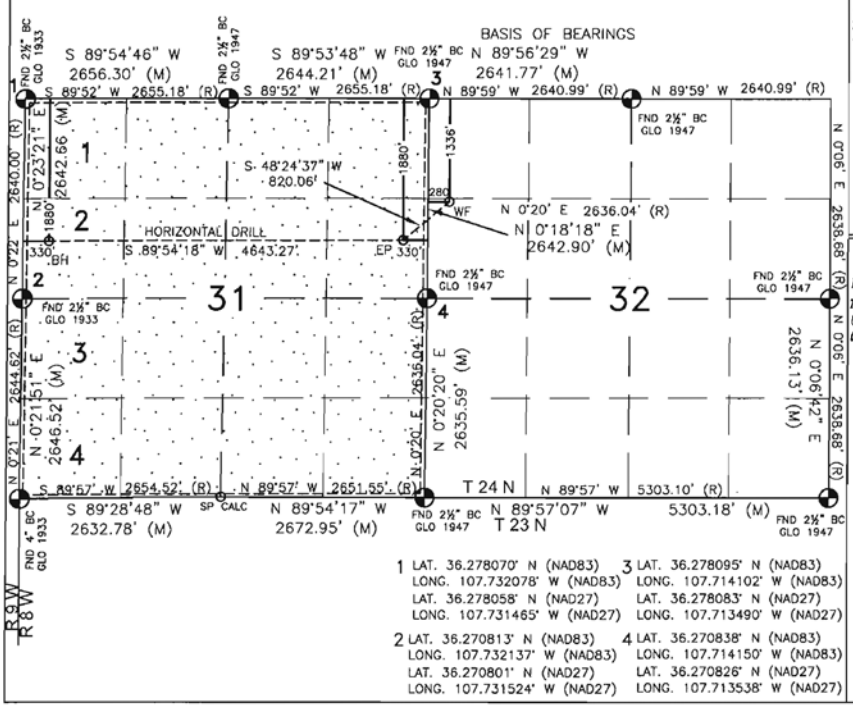
16

BOTTOM HOLE
LAT. 36.272909' N (NAD83)
LONG. 107.731001' W (NAD83)
LAT. 36.272897' N (NAD27)
LONG. 107.731001' W (NAD27)

ENTRY POINT
LAT. 36.272931' N (NAD83)
LONG. 107.715255' W (NAD83)
LAT. 36.272919' N (NAD27)
LONG. 107.714643' W (NAD27)

WELL FLAG
LAT. 36.274426' N (NAD83)
LONG. 107.713175' W (NAD83)
LAT. 36.274414' N (NAD27)
LONG. 107.712563' W (NAD27)



1 LAT. 36.278070' N (NAD83)
LONG. 107.732078' W (NAD83)
LAT. 36.278058' N (NAD27)
LONG. 107.731465' W (NAD27)

2 LAT. 36.270813' N (NAD83)
LONG. 107.732137' W (NAD83)
LAT. 36.270801' N (NAD27)
LONG. 107.731524' W (NAD27)

3 LAT. 36.278095' N (NAD83)
LONG. 107.714102' W (NAD83)
LAT. 36.278083' N (NAD27)
LONG. 107.713490' W (NAD27)

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Printed Name

E-mail Address

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JULY 31, 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: 36.274508° N
LONGITUDE: 107.713178° W
DATUM: NAD83

ENCANA OIL & GAS (USA) INC.

ESCRITO D32-2408 #01H
1306' FNL & 280' FWL
LOCATED IN THE NW/4 NW/4 OF SECTION 32,
T24N, R8W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO
GROUND ELEVATION: 6943', NAVD 88
FINISHED PAD ELEVATION: 6944.9', NAVD 88

MN
9.57° E
TN

50' 0 50' 100'
SCALE = 100'

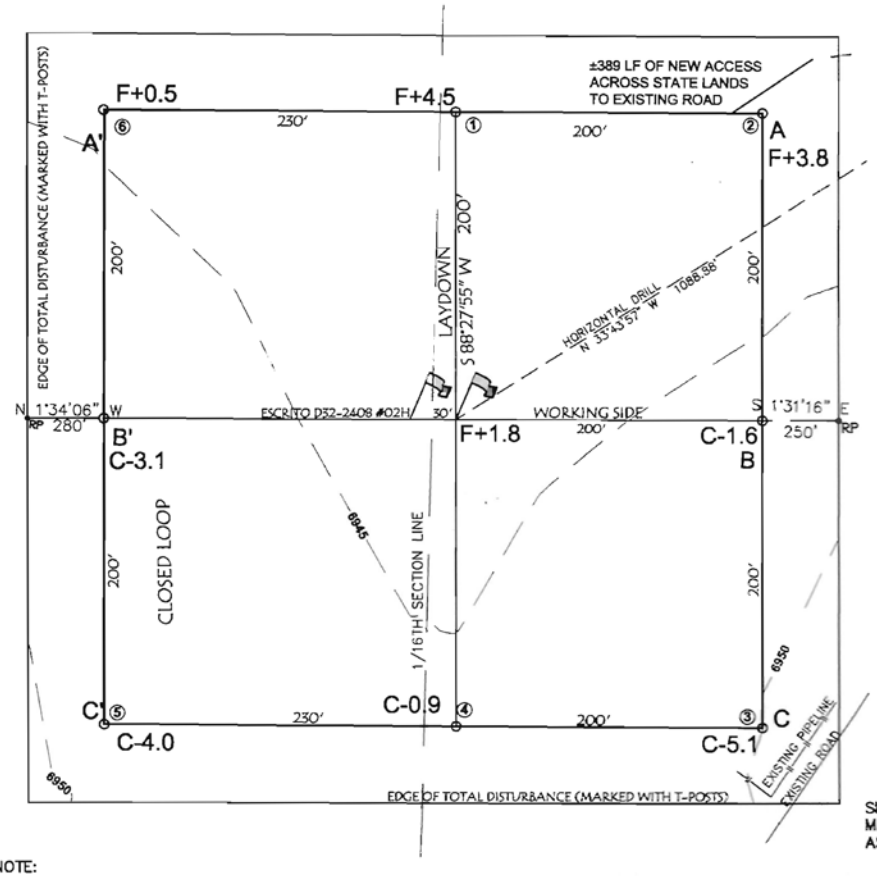
NOTES:

1.) BASIS OF BEARING: BETWEEN FOUND MONUMENTS AT THE NORTHWEST CORNER AND THE NORTH QUARTER CORNER OF SECTION 32, TOWNSHIP 24 NORTH, RANGE 8 WEST, N.M.P.M. SAN JUAN COUNTY, NEW MEXICO.
LINE BEARS: N 89°56'29" W A DISTANCE OF 2641.77 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 ~
STATE LANDS

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

TOTAL PERMITTED AREA
500' x 530' = 6.08 ACRES
SCALE: 1" = 100'
JOB No.: ENC006
DATE: 09/18/13
DRAWN BY: TWT

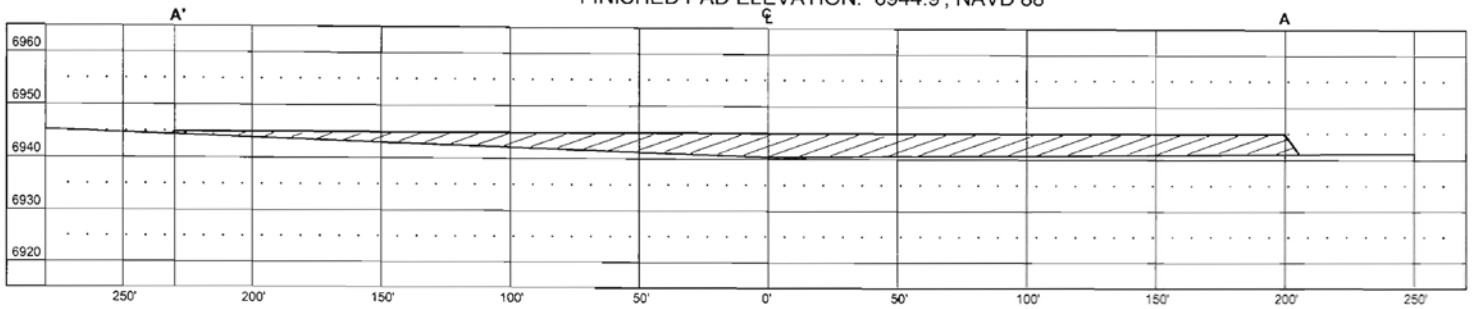
NOTE:
SCORPION SURVEY & CONSULTING, L.L.C. IS NOT LIABLE FOR UNDERGROUND UTILITIES OR PIPELINES. CONTRACTOR SHOULD CALL ONE-CALL FOR LOCATION OF ANY MARKED OR UNMARKED, BURIED PIPELINES OR CABLES ON WELL PAD, IN CONSTRUCTION ZONE AND/OR ACCESS ROAD AT LWEST TWO (2) WORKING DAYS PRIOR TO CONSTRUCTION.

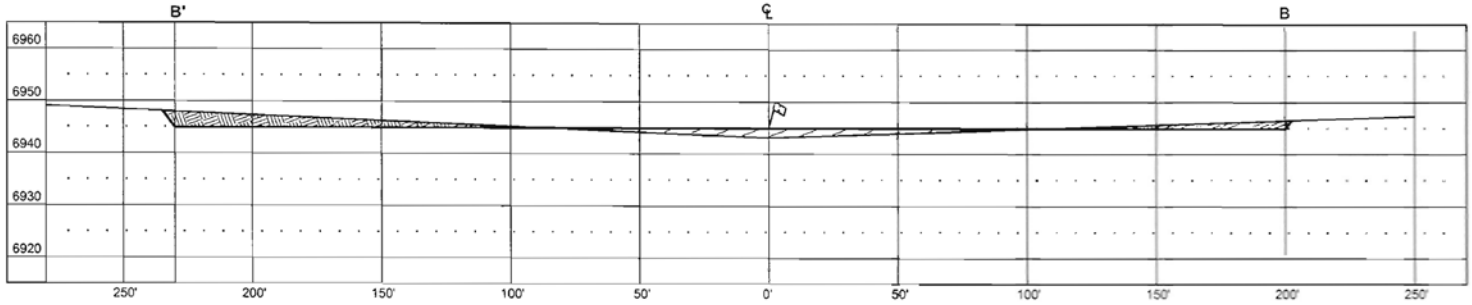
Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

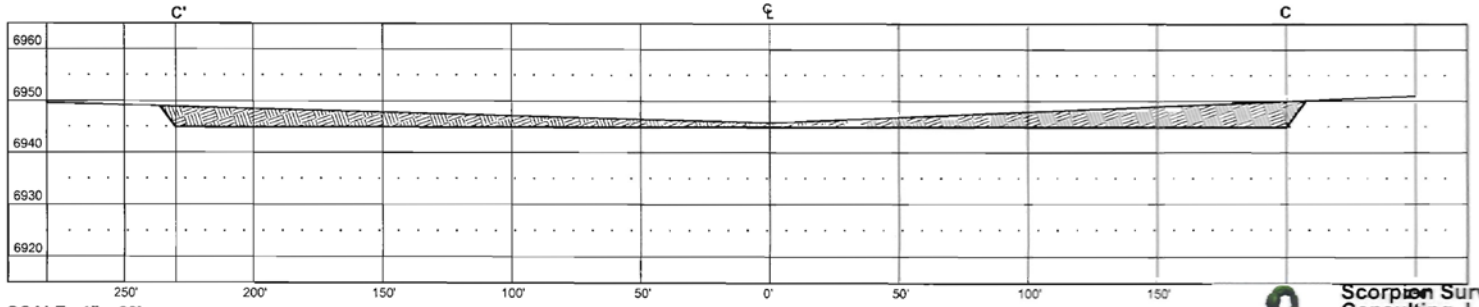
LATITUDE: 36.274508° N
LONGITUDE: 107.713178° W
DATUM: NAD 83

ENCANA OIL & GAS (USA) INC.

ESCRITO D32-2408 #01H
1306' FNL & 280' FWL
LOCATED IN THE NW/4 NW/4 OF SECTION 32, T24N, R8W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO
GROUND ELEVATION: 6943', NAVD 88
FINISHED PAD ELEVATION: 6944.9', NAVD 88







VERT. SCALE: 1" = 30'
HORZ. SCALE: 1" = 60'
JOB No.: ENC006
DATE: 07/18/13

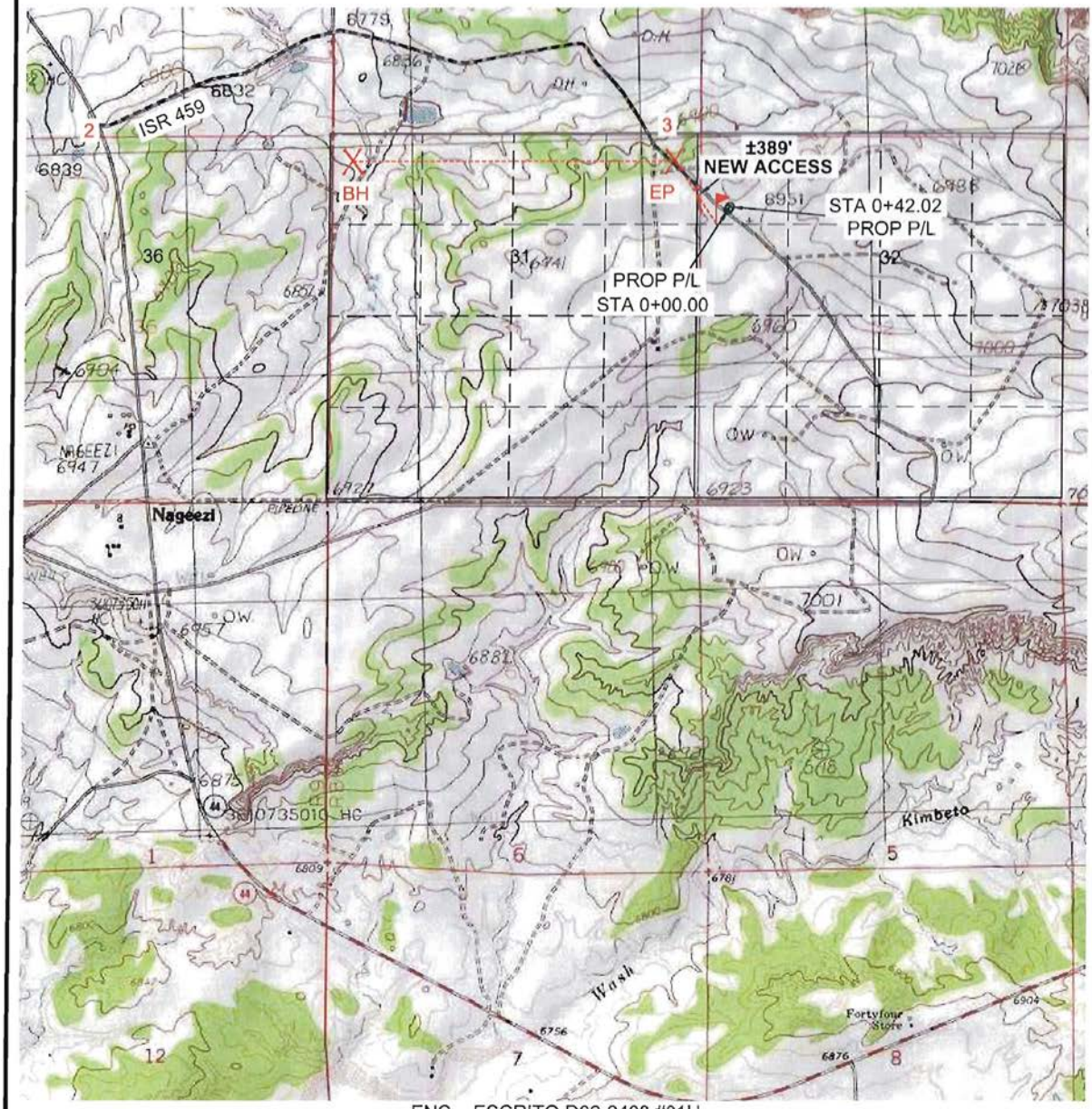
THIS DIAGRAM IS AN ESTIMATE OF DIRT BALANCE AND IS NOT INTENDED TO BE AN EXACT MEASURE OF VOLUME

FILL CUT

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

LATITUDE: 36.274508° N
LONGITUDE: 107.713178° W
DATUM: NAD 83

ENCANA OIL & GAS (USA) INC.
ESCRITO D32-2408 #01H
1306' FNL & 280' FWL
LOCATED IN THE NW/4 NW/4 OF SECTION 32,
T24N, R8W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO
GROUND ELEVATION: 6943', NAVD 88
±389' OF NEW ACCESS ACROSS STATE LANDS



U.S.G.S. QUAD: CROW MESA WEST
SCALE: 1" = 2000' (1:24,000)
JOB No.: ENC006
DATE: 09/18/13

ENC ~ ESCRITO D32-2408 #01H
±389' OF NEW ACCESS
INSTALL NEW 24" CMP
STA. 0+00 - BEGIN ACCESS
STA. 3+88.78 @ WELL PAD

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

PROPOSED ACCESS FOR

ENCANA OIL & GAS (USA) INC.

ESCRITO D32-2408 #01H

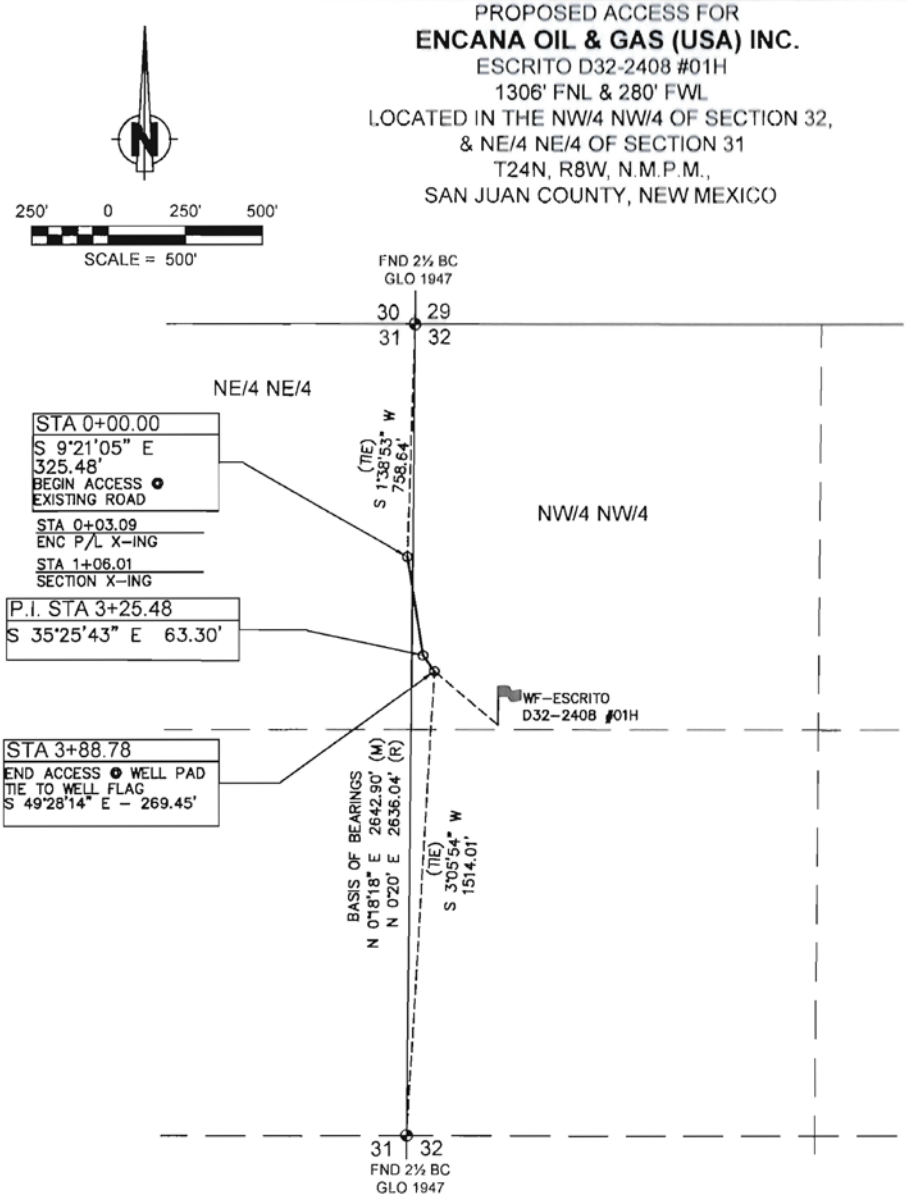
1306' FNL & 280' FWL

LOCATED IN THE NW/4 NW/4 OF SECTION 32,

& NE/4 NE/4 OF SECTION 31

T24N, R8W, N.M.P.M.,

SAN JUAN COUNTY, NEW MEXICO



~ SURFACE OWNERSHIP ~ STATE LANDS		
SECTION 31 NW/4 NW/4		
0+00 TO 1+06.01		
106.01 FT / 6.42 RODS		
SECTION 32 NE/4 NE/4		
1+06.01 TO 3+88.78		
282.77 FT / 17.14 RODS		
TOTAL		
0+00 TO 3+88.78		
388.78 FT / 23.56 RODS		
DATE OF SURVEY	07/31/13	JC, MR

NOTES:

1.) BASIS OF BEARING: BETWEEN FOUND MONUMENTS AT THE NORTHWEST CORNER AND THE WEST QUARTER CORNER OF SECTION 32, TOWNSHIP 24 NORTH, RANGE 8 WEST, N.M.P.M. SAN JUAN COUNTY, NEW MEXICO. LINE BEARS: N 0°18'18" E A DISTANCE OF 2642.90 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.

DAVID R. RUSSELL NEW MEXICO 10201 REGISTERED PROFESSIONAL LAND SURVEYOR

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

DATE: Oct 11, 2013

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

JOB No.: ENC006

DATE: 09/18/13

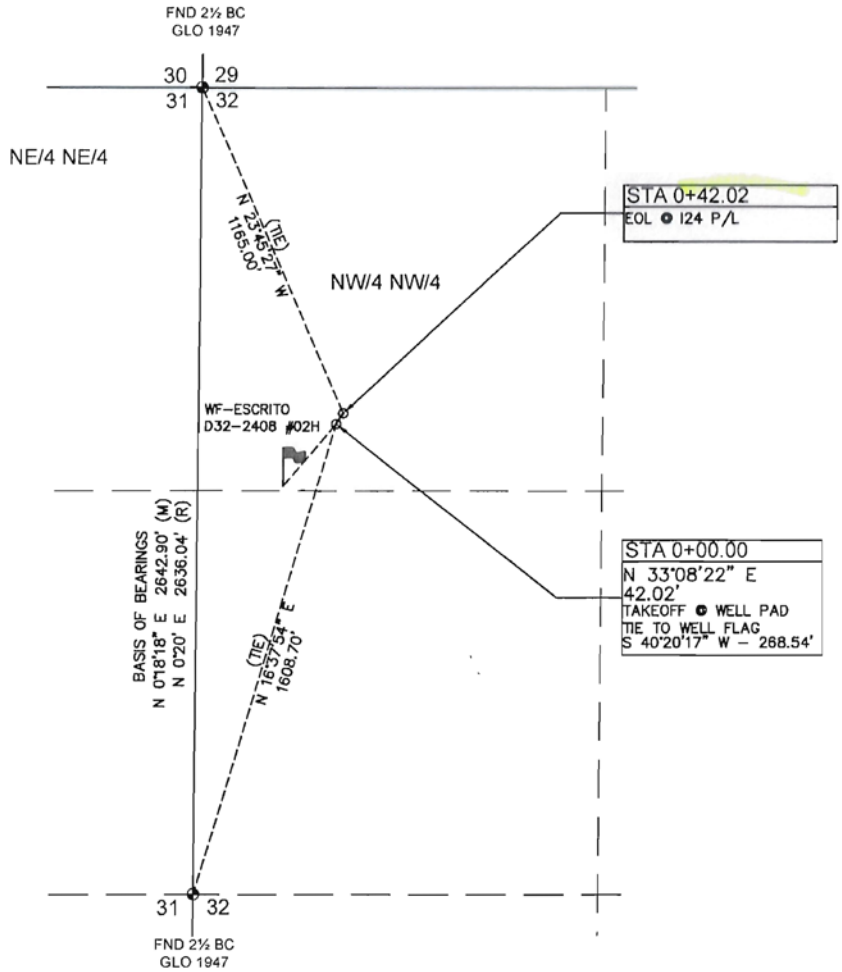
Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

PROPOSED PIPELINE FOR

ENCANA OIL & GAS (USA) INC.

ESCRITO D32-2408 #02H
1306' FNL & 280' FWL
LOCATED IN THE NW/4 NW/4 OF SECTION 32,
T24N, R8W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO

250' 0 250' 500'
SCALE = 500'



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~ SURFACE OWNERSHIP ~ STATE LANDS		
SECTION 32 NW/4 NW/4		
0+00 TO 0+42.02		
42.02 FT / 2.55 RODS		
DATE OF SURVEY	07/31/13	JC, MR

DAVID R. RUSSELL
NEW MEXICO
10201
REGISTERED PROFESSIONAL LAND SURVEYOR

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

DATE: Oct 11, 2013

JOB No.: ENC006 DATE: 09/18/13

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

C.2. **Proposed Escrito M32**

DISTRICT I
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[1] API Number	[2] Pool Code	[3] Pool Name
	97232	BASIN MANCOS GAS

[4] Property Code	[5] Property Name	[6] Well Number
	ESCRITO M32-2408	01H

[7] OGRID No.	[8] Operator Name	[9] Elevation
282327	ENCANA OIL & GAS (USA) INC.	6913.5'

[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
M	32	24N	8W		413'	SOUTH	60'	WEST	SAN JUAN

[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
M	31	24N	8W	4	400'	SOUTH	330'	WEST	SAN JUAN

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
PROJECT AREA 640.00 ACRES ALL OF SEC. 31			

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BOTTOM HOLE
LAT. 36.264652° N (NAD83)
LONG. 107.731065° W (NAD83)
LAT. 36.264640° N (NAD27)
LONG. 107.730452° W (NAD27)

ENTRY POINT
LAT. 36.264700° N (NAD83)
LONG. 107.715313° W (NAD83)
LAT. 36.264687° N (NAD27)
LONG. 107.714701° W (NAD27)

WELL FLAG
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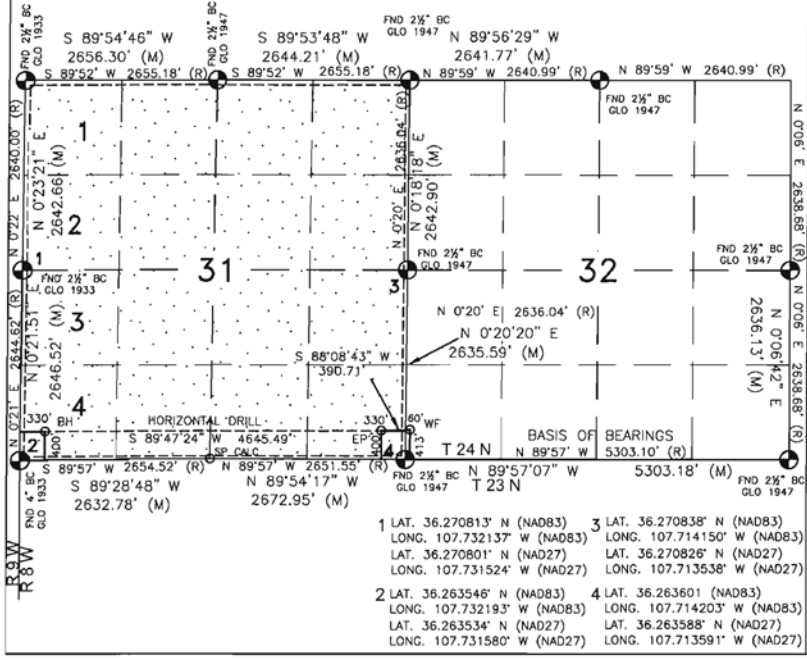
LONG. 107.713990° W (NAD83)
LAT. 36.264722° N (NAD27)
LONG. 107.713378° W (NAD27)



1 LAT. 36.270813° N (NAD83)
LONG. 107.732137° W (NAD83)
LAT. 36.270801° N (NAD27)
LONG. 107.731524° W (NAD27)

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LONG. 107.732193° W (NAD83)
LAT. 36.263534° N (NAD27)
LONG. 107.731580° W (NAD27)

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LONG. 107.714150° W (NAD83)
LAT. 36.270826° N (NAD27)
LONG. 107.713538° W (NAD27)

4 LAT. 36.263601° N (NAD83)
LONG. 107.714203° W (NAD83)
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18

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Printed Name

E-mail Address

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JULY 31, 2013
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REGISTERED PROFESSIONAL LAND SURVEYOR

DAVID RUSSELL
Certificate Number 10201

WELL FLAG
LATITUDE: 36.264735° N
LONGITUDE: 107.713990° W
DATUM: NAD83

ENCANA OIL & GAS (USA) INC.

ESCRITO M32-2408 #01H
413' FSL & 60' FWL
LOCATED IN THE SW/4 SW/4 OF SECTION 32,
T24N, R8W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO
GROUND ELEVATION: 6912', NAVD 88
FINISHED PAD ELEVATION: 6913.5', NAVD 88

MN
TN
9.57° E

50' 0 50' 100'
SCALE = 100'

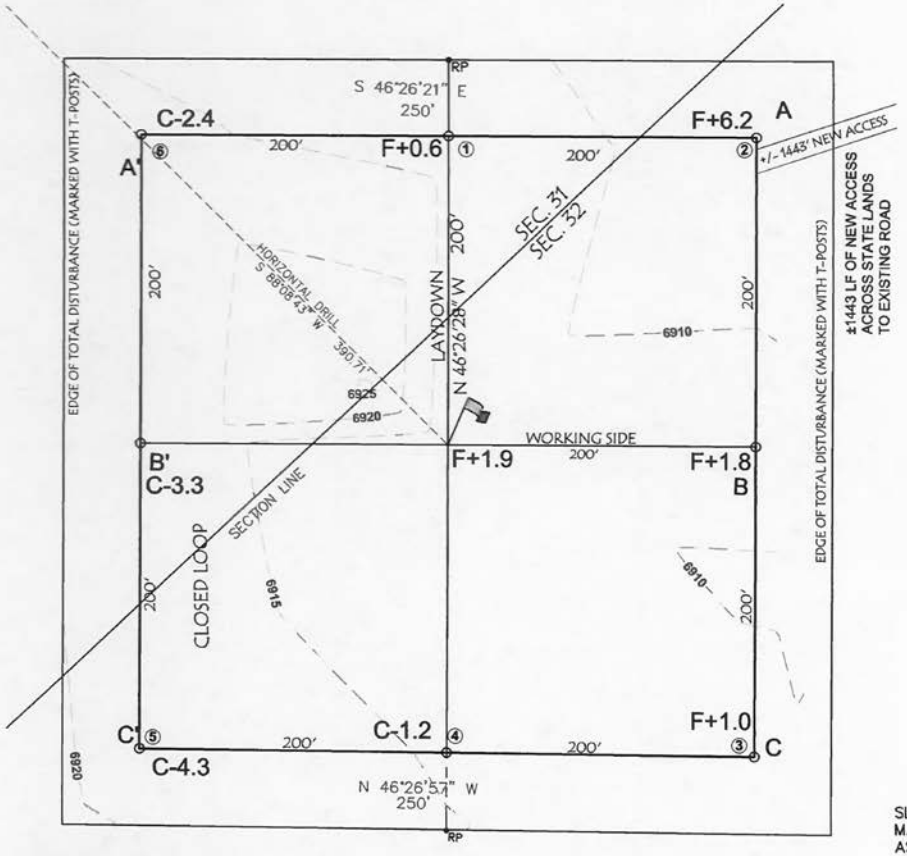
NOTES:

1.) BASIS OF BEARING: BETWEEN FOUND MONUMENTS AT THE SOUTHWEST CORNER AND THE SOUTHEAST CORNER OF SECTION 32, TOWNSHIP 24 NORTH, RANGE 8 WEST, N.M.P.M. SAN JUAN COUNTY, NEW MEXICO.
LINE BEARS: N 89°57'07" W A DISTANCE OF 5303.18 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



±1443 LF OF NEW ACCESS ACROSS STATE LANDS TO EXISTING ROAD

~ SURFACE OWNERSHIP ~
STATE LANDS

TOTAL PERMITTED AREA
500' x 500' = 5.74 ACRES
SCALE: 1" = 100'
JOB No.: ENC098_REV1
DATE: 12/04/13
DRAWN BY: TWT

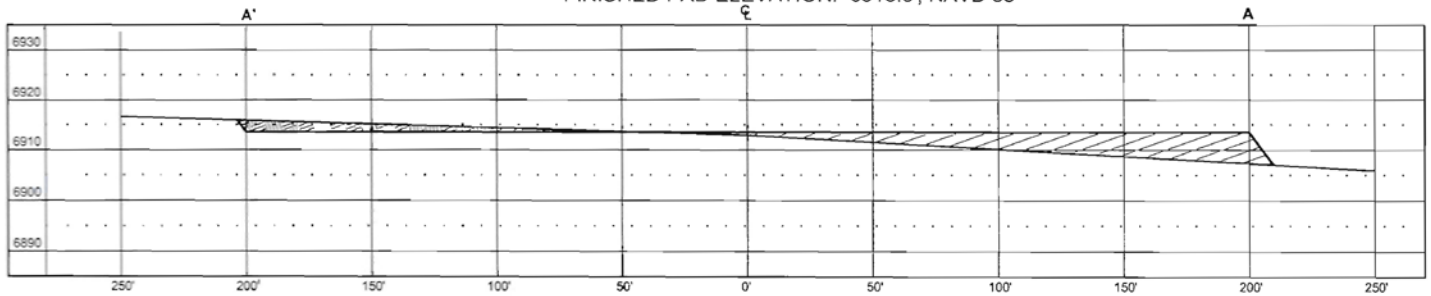
NOTE:
SCORPION SURVEY & CONSULTING, L.L.C. IS NOT LIABLE FOR UNDERGROUND UTILITIES OR PIPELINES. CONTRACTOR SHOULD CALL ONE-CALL FOR LOCATION OF ANY MARKED OR UNMARKED, BURIED PIPELINES OR CABLES ON WELL PAD, IN CONSTRUCTION ZONE AND/OR ACCESS ROAD AT LWEST TWO (2) WORKING DAYS PRIOR TO CONSTRUCTION.

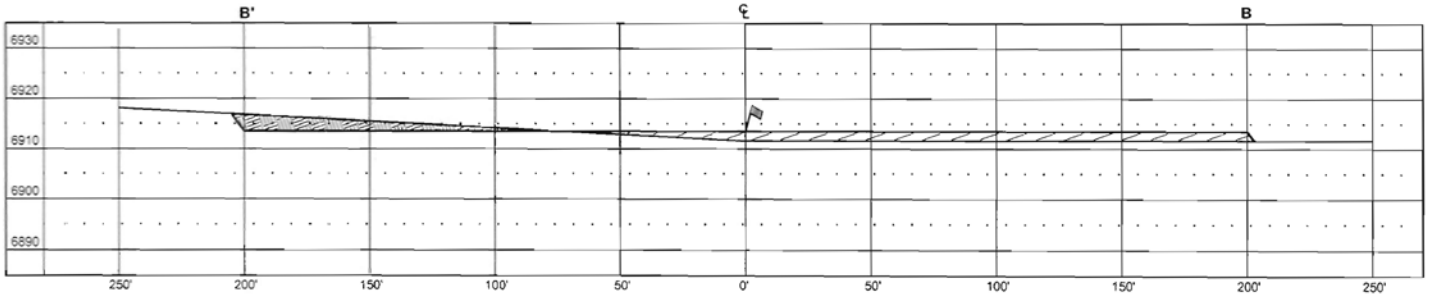
SLOPES TO BE CONSTRUCTED TO MATCH THE ORIGINAL CONTOURS AS CLOSE AS POSSIBLE.

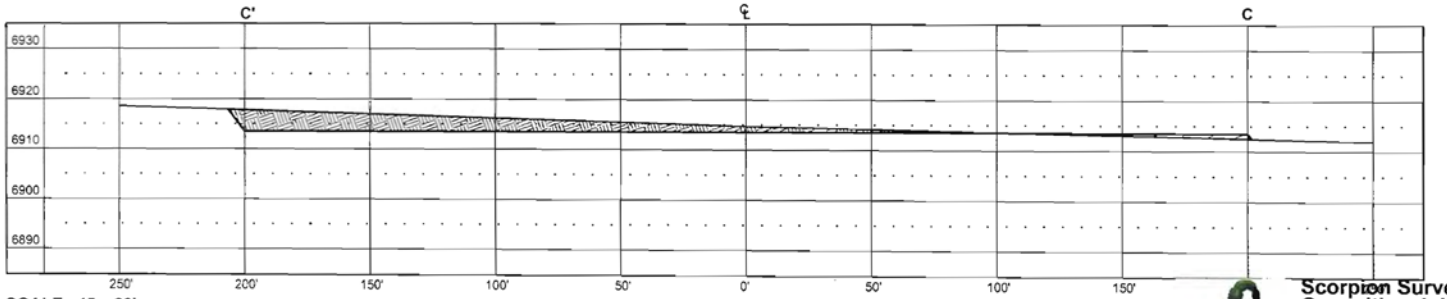
Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
(505) 334-4007

LATITUDE: 36.264735° N
LONGITUDE: 107.713990° W
DATUM: NAD 83

ENCANA OIL & GAS (USA) INC.
ESCRITO M32-2408 #01H
413' FSL & 60' FWL
LOCATED IN THE SW/4 SW/4 OF SECTION 32, T24N, R8W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO
GROUND ELEVATION: 6912', NAVD 88
FINISHED PAD ELEVATION: 6913.5', NAVD 88







VERT. SCALE: 1" = 30'
HORZ. SCALE: 1" = 60'
JOB No.: ENC098
DATE: 07/18/13

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

FILL CUT

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LATITUDE: 36.264735° N
LONGITUDE: 107.713990° W
DATUM: NAD 83

ENCANA OIL & GAS (USA) INC.
ESCRITO M32-2408 #01H
413' FSL & 60' FWL
LOCATED IN THE SW/4 SW/4 OF SECTION 32,
T24N, R8W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO
GROUND ELEVATION: 6912', NAVD 88
±1443' OF NEW ACCESS ACROSS STATE LANDS

ENC ~ ESCRITO M32-2408 #01H
±1443' OF NEW ACCESS
INSTALL NEW 24" CMP
STA. 0+00 - BEGIN ACCESS
STA. 4+16.93 - WASH X-ING
STA. 14+05.20 - WASH X-ING
STA. 14+43.32 @ WELL PAD

U.S.G.S. QUAD: CROW MESA WEST
SCALE: 1" = 2000' (1:24,000)
JOB No.: ENC098_REV1
DATE: 12/04/13

Scorpion Survey & Consulting, L.L.C.
302 South Ash
Aztec, New Mexico 87410
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PROPOSED ACCESS FOR

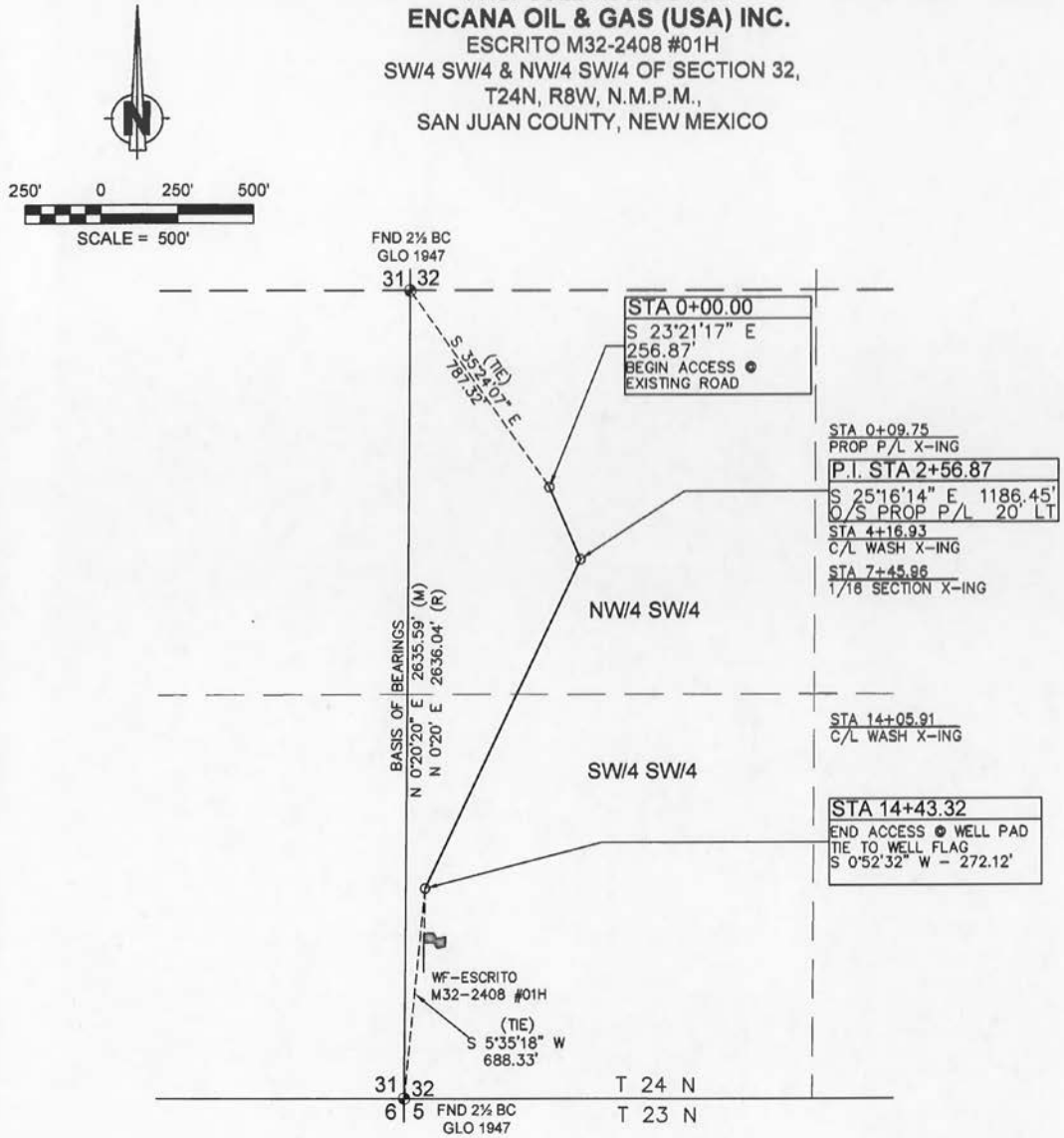
ENCANA OIL & GAS (USA) INC.

ESCRITO M32-2408 #01H

SW/4 SW/4 & NW/4 SW/4 OF SECTION 32,

T24N, R8W, N.M.P.M.,

SAN JUAN COUNTY, NEW MEXICO



~ SURFACE OWNERSHIP ~ STATE LANDS		
SECTION 32 NE/4 SE/4		
0+00 TO 7+45.96		
745.96 FT / 45.21 RODS		
SECTION 32 SE/4 SE/4		
7+45.96 TO 14+43.32		
697.36 FT / 42.26 RODS		
TOTAL		
0+00 TO 14+43.32		
1443.32 FT / 87.47 RODS		
DATE OF SURVEY	12/04/13	JC

NOTES:

1.) BASIS OF BEARING: BETWEEN FOUND MONUMENTS AT THE SOUTHWEST CORNER AND THE WEST QUARTER CORNER OF SECTION 32, TOWNSHIP 24 NORTH, RANGE 8 WEST, N.M.P.M. SAN JUAN COUNTY, NEW MEXICO.
LINE BEARS: N 0°20'20" E A DISTANCE OF 2635.59 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.

DAVID R. RUSSELL NEW MEXICO 10201 REGISTERED PROFESSIONAL LAND SURVEYOR

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: Dec. 19, 2013

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

JOB No.: ENC098_REV1 DATE: 12/04/13

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

PROPOSED PIPELINE FOR

ENCANA OIL & GAS (USA) INC.

ESCRITO M32-2408 #02H

413' FSL & 60' FWL

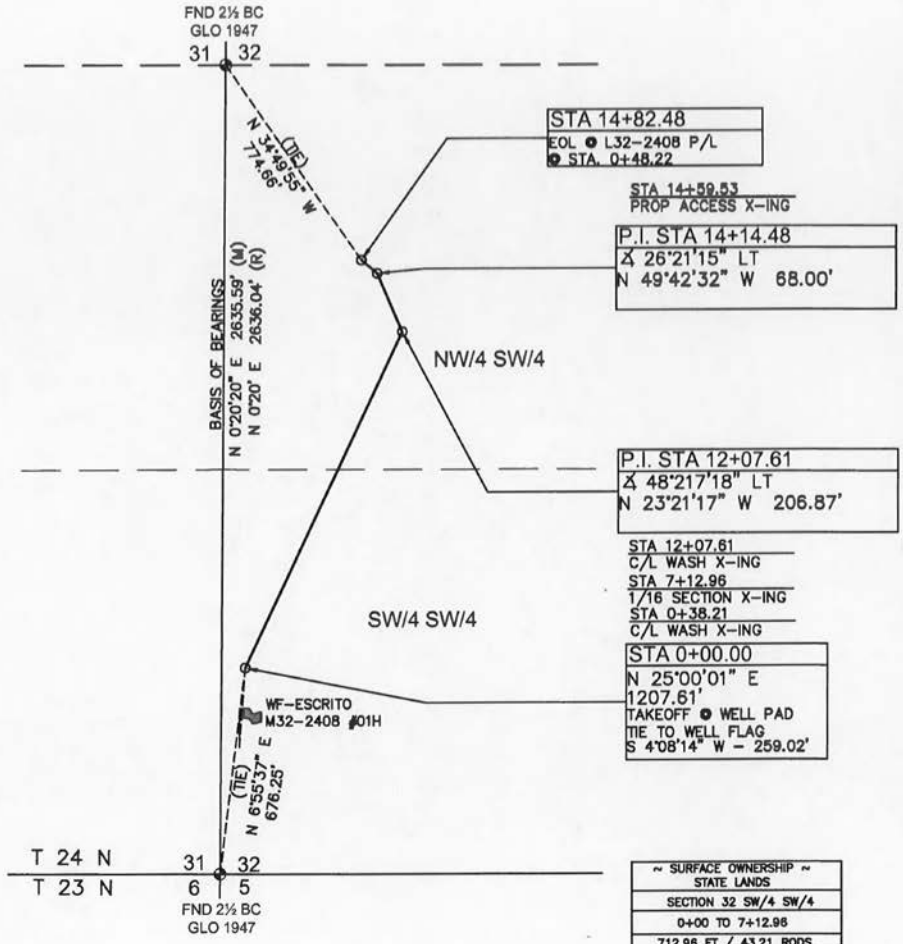
LOCATED IN THE SW/4 SW/4 & NW/4 SW/4 OF SECTION 32,

T24N, R8W, N.M.P.M.,

SAN JUAN COUNTY, NEW MEXICO

250' 0 250' 500'

SCALE = 500'



~ SURFACE OWNERSHIP ~ STATE LANDS
SECTION 32 SW/4 SW/4
0+00 TO 7+12.96
712.96 FT / 43.21 RODS
SECTION 32 NW/4 SW/4
7+12.96 TO 14+82.48
769.52 FT / 46.64 RODS
TOTAL
0+00 TO 14+82.48
1482.48 FT / 89.85 RODS
DATE OF SURVEY 07/31/13 JC, MR

NOTES:

1.) BASIS OF BEARING: BETWEEN FOUND MONUMENTS AT THE SOUTHWEST CORNER AND THE WEST QUARTER CORNER OF SECTION 32, TOWNSHIP 24 NORTH, RANGE 8 WEST, N.M.P.M. SAN JUAN COUNTY, NEW MEXICO. LINE BEARS: N 0°20'20" E A DISTANCE OF 2635.59 FEET AS MEASURED BY G.P.S.

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DAVID R. RUSSELL NEW MEXICO 10201 REGISTERED PROFESSIONAL LAND SURVEYOR

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David R Russell

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

DATE: Dec. 19, 2013

JOB No.: ENC098_REV1 DATE: 12/04/13

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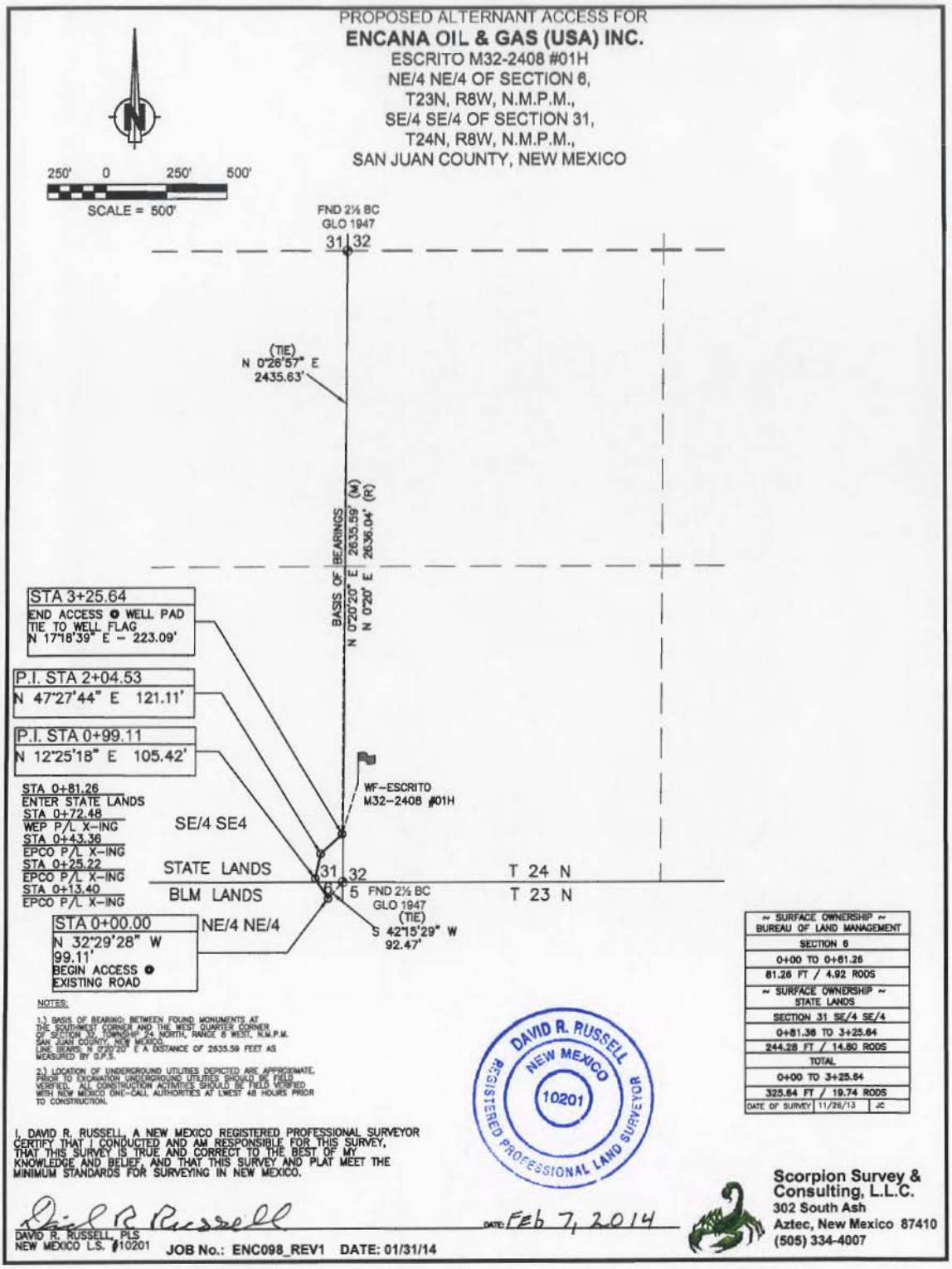
C.3. **Alternative Escrito M32 Access Road**



APPENDIX D. PHOTOGRAPHS

D.1 Proposed Escrito D32

View from start (northern end) of proposed access road facing southeastward along proposed corridor

View from end (southern end) of proposed access road facing northward along proposed corridor

View from start (southwestern end) of proposed pipeline corridor facing northeastward along proposed corridor

View from end (northeastern end) of proposed pipeline corridor facing southwestward along proposed corridor

View from proposed wellheads facing northward

View from proposed wellheads facing eastward

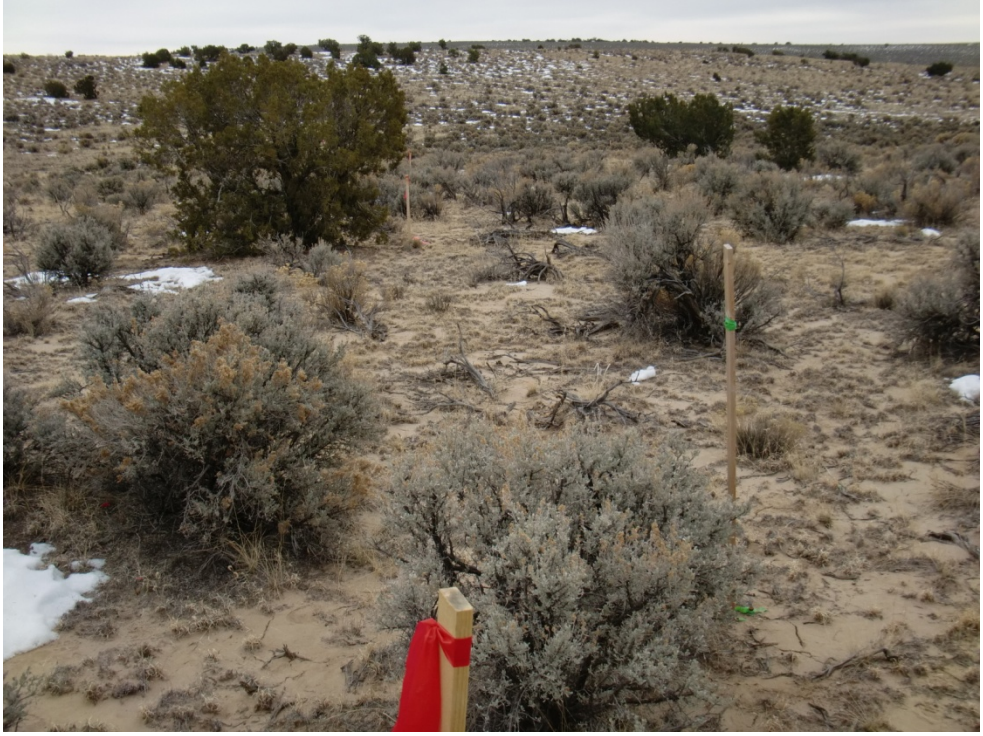
View from proposed wellheads facing southward

View from proposed wellheads facing westward

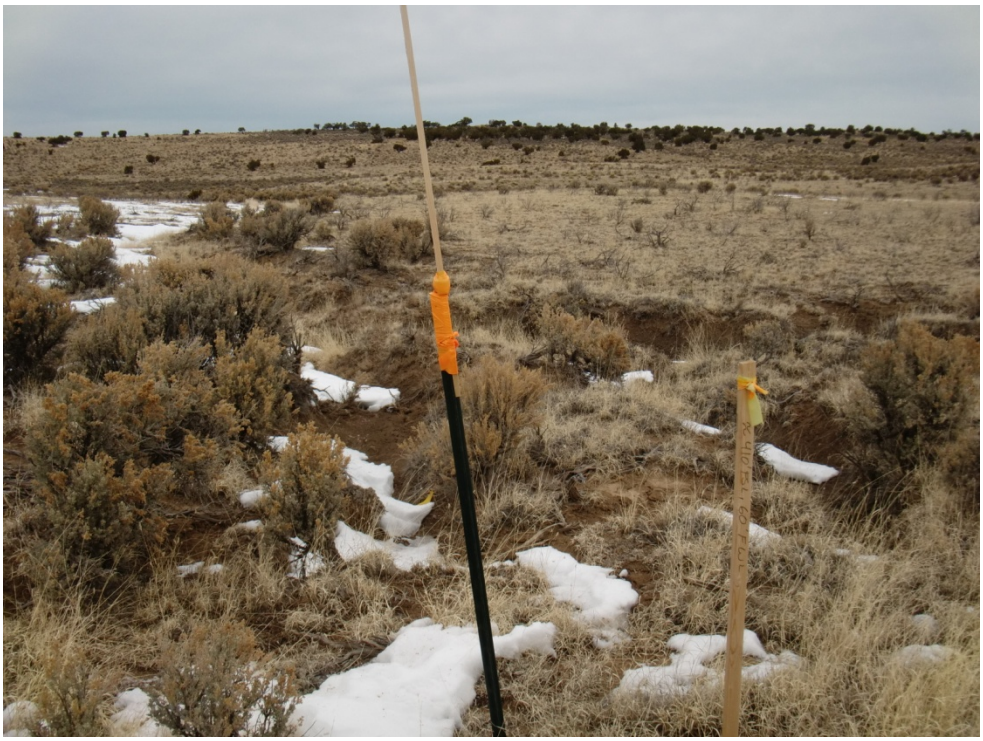
D.2 Proposed Escrito M32

View from beginning (northern end) of proposed access road/pipeline tcorridor facing southwestward along proposed corridor

View from the approximate center of proposed access road/pipeline corridor acing north- northwestward along proposed corridor



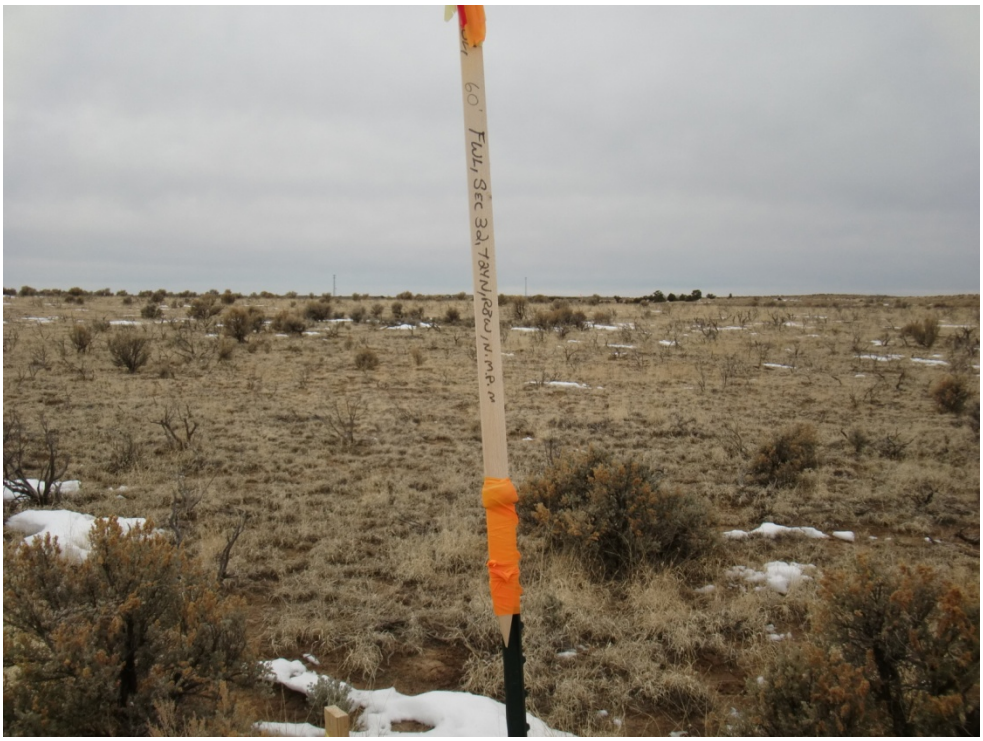
View from end (southern end) of proposed access road/pipeline corridor facing north- northwestward along proposed corridor



View from proposed wellhead facing northward

View from proposed wellhead facing eastward

View from proposed wellhead facing southward



View from proposed wellheads facing westward

D.1 Alternative Escrito M32 Access Road

View from start (southern end) of alternative Escrito M32 access road, looking northward along alternative corridor

View from end (northern end) of alternative Escrito M32 access road, looking southward along alternative corridor