BUREAU OF LAND MANAGEMENT
FARMINGTON FIELD OFFICE

ENVIRONMENTAL ASSESSMENT

FOR

Application for Permit to Drill

Encana Oil & Gas (USA) Inc.

Lybrook A03-2206 No. 01H
&
Lybrook H03-2206 No. 01H

Well Pads, Access Roads, and Well-tie Pipelines
Lease # NMNM 109386

NM- F010- 2012- 198

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1.0 Introduction

A representative of Encana Oil & Gas (USA) Inc. (Encana), filed an Application for a Permit to Drill (APD) with the BLM for the Lybrook A03-2206 No. 01H and the Lybrook H03-2206 No. 01H wells, and construct the associated on-lease access roads and well-tie pipelines. The proposed project is located in the NE/4 of Section 3, Township 22N, Range 6W, in Sandoval County, New Mexico.

This site-specific analysis tiers into and incorporates by reference the information and analysis contained in the Farmington Proposed Resource Management Plan Final Environmental Impact Statement (PRMP/FEIS). This project EA addresses site-specific resources and/or impacts that are not specifically covered within the PRMP/FEIS, as required by the National Environmental Policy Act of 1969 (NEPA), as amended (Public Law 91-90, 42 U.S.C. 4321 et seq.).

1.1 Purpose and Need

The purpose for the proposal is to define and produce minerals on one or more valid federal mineral leases issued to the applicant by the BLM. It is the policy of the BLM to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs. The Mineral Leasing Act of 1920 (MLA), as amended [30 USC 181 et seq.], authorizes the BLM to issue oil and gas leases for the exploration of oil and gas and permit the development of those leases. The existing lease is a binding legal contract that allows development of the mineral by the holder. An approved Application for Permit to Drill (APD), issued by the BLM, authorizes the applicant to construct and drill the proposed well.

The Lybrook A03-2206 No. 01H and Lybrook H03-2206 No. 01H wells would allow Encana to develop their lease and provide additional oil and gas for the national energy market, which would also generate federal and state tax revenue, as well as revenue for Encana.

1.2 Conformance with Applicable Land Use Plan and Other Environmental Assessments

Pursuant to 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21, this site-specific environmental assessment (EA) tiers to and incorporates by reference the information and analysis contained in the Farmington Proposed Resource Management Plan/Final Environmental Impact Statement [(PRMP/FEIS) BLM 2003a], which was approved as the Final Resource Management Plan for the Farmington Field Office (FFO) of the BLM by the Record of Decision (ROD) signed September 29, 2003 (BLM 2003b). The PRMP/FEIS, Final Plan, and Record of Decision are available for review at the BLM Farmington Field Office, 6251 College Blvd., Suite A, Farmington, New Mexico 87402, or electronically at:

http://www.blm.gov/nm/st/en/fo/Farmington_Field_Office/farmington_rmp.html

This EA addresses the resources and impacts on a site-specific basis as required by the National Environmental Policy Act (NEPA) of 1969, as amended (Public Law 91-90, 42 USC 4321 et seq.). The proposed project would not be in conflict with any local, county, or state plans.

1.3 Federal, State or Local Permits, Licenses or Other Consultation Requirements

1.3.1 Clean Water Act of 1977

Under Section 402 of the Clean Water Act (as amended), the U.S. Environmental Protection Agency (EPA) was directed to develop a phased approach to regulate storm water discharges under the National Pollutant Discharge Elimination System (NPDES) program. Industrial activities disturbing land may require permit coverage through a NPDES storm water discharge. Depending on the acreage disturbed, either a Phase I industrial activity (five or more acres disturbance), or a Phase II small construction activity (between one and five acres disturbance) permit may be required. However, gas and oil activities

have been exempted from NPDES permitting in New Mexico. Additionally, a U.S. Army Corps of Engineers Section 404 permit for the discharge of dredge and fill materials may also be required. Operators are required to obtain all necessary permits and approvals prior to any disturbance activities.

1.3.2 Endangered Species Act of 1973

The Endangered Species Act (ESA) of 1973 requires all federal departments and agencies to conserve threatened, endangered, critical, and sensitive species and the habitats on which they depend, and to consult with the U.S. Fish and Wildlife Service (USFWS) on all actions authorized, funded, or carried out by the agency to ensure that the action will not likely jeopardize the continued existence of any threatened and endangered species or adversely modify critical habitat. Consultation with the USFWS, as required by Section 7 of the ESA, was conducted as part of the Farmington PRMP/FEIS (Consultation No. 2-22-01-I-389) to address cumulative effects of RMP implementation. The consultation is summarized in Appendix M of the PRMP/FEIS. Farmington Field Office staff reviewed the proposed action and determined it would be in compliance with threatened and endangered species management guidelines outlined in the September 2002 Biological Assessment (Consultation No. 2-22-01-I-389). No further consultation with the U.S. Fish and Wildlife Service is required.

1.3.3 National Historic Preservation Act of 1966

Compliance with Section 106 responsibilities of the National Historic Preservation Act are adhered to by following the BLM – New Mexico State Historic Preservation Officer (SHPO) protocol agreement, which is authorized by the *National Programmatic Agreement between the BLM*, the *Advisory Council on Historic Preservation*, and the *National Conference of State Historic Preservation Officers*, and other applicable BLM handbooks.

Additionally, the Operator is required to:
· Comply with all applicable Federal, State, Tribal, and Local laws and regulations.
· Obtain the necessary permits for the drilling, completion, and production of these wells, including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
· Certify that a Surface Use Agreement has been reached with private landowners where required.

2.0 Alternatives Including the Proposed Action

2.1 Alternative A - No Action

The BLM NEPA Handbook (H-1790-1) states that for Environmental Assessments (EAs) on externally initiated proposed actions, the No Action Alternative generally means that the proposed activity will not take place. This option is provided in 43 CFR 3162.3-1 (h) (2). This alternative would deny the approval of the proposed application, and the current land and resource uses would continue to occur in the proposed project area. No mitigation measures would be required.

2.2 Alternative B – Proposed Action

Encana proposes to construct two well pads, access roads, and well-tie pipelines in order to horizontally drill and develop federal minerals in the Gallup pool of the Mancos Shale Formation. Access to the proposed well locations would be gained by traveling south on US Highway 550 from Bloomfield, New Mexico for approximately 53.6 miles. Turn right on Indian Service Route 46 and travel southerly for approximately 2.8 miles. The staked access to the proposed Lybrook A03-2206 No. 01H is located on the right. Continue approximately 0.5 miles south to the staked access to the proposed Lybrook H03-2206 No. 2H on the right. The proposed project is on BLM and State of New Mexico surface with federal minerals administered by the BLM/FFO. Total new surface disturbance for the proposed project would be approximately 8.46 acres; 7.58 acres on BLM surface and 0.88 acres on State of New Mexico surface.

The proposed well pads would be 300 feet by 300 feet with an additional 50-foot construction buffer zone around the perimeter of the pad. The Lybrook A03-2206 No. 01H well pad would require between 2 and 12 feet of fill on the north and east sides of the location, and between 4 and 12 feet of cut on the south and west sides of the location. The Lybrook H03-2206 No. 01H well pad would require between 6 and 11 feet of fill on the north and east sides of the location, and between 10 and 11 feet of cut on the south and west sides of the location. The construction buffer zones may be used to stockpile topsoil or vegetative material that would be utilized later during reclamation. Cut and fill slopes would be returned to the original contour upon reclamation. New surface disturbance from the proposed well locations would be approximately 7.35 acres; 6.86 acres on BLM surface and 0.49 acres on State of New Mexico surface.

Potential storm water run-off would be diverted around and away from the well locations. Drainages would be established at both well locations upon interim reclamation once final site layout has been established. Sandstone armor would be placed along the existing erosional feature on the east side of the Lybrook A03-2206 location between corners five (5) and six (6). A silt trap would be installed off of corner two (2) of the Lybrook H03-2206 location.

A new access road approximately 405 feet in length with an average clearing width of 30 feet would be developed to BLM “Gold Book” standards to provide access to the proposed Lybrook A03-2206 No. 01H well pad. A culvert would be installed within the proposed access road along the existing drainage crossing the road. A new access road approximately 420 feet in length with an average clearing width of 30 feet would be developed to BLM “Gold Book” standards to provide access to the proposed Lybrook H03-2206 No. 01H well pad. A culvert would be installed within the proposed access road on the south side of the location. New surface disturbance from the construction of proposed access roadway would be approximately 0.57 acres; 0.33 acres on BLM surface and 0.24 acres on State of New Mexico surface.

Once the proposed Lybrook A03-2206 No. 01H well is completed, an associated 596-foot long well-tie pipeline would be constructed to transport produced natural gas to the proposed Encana Lybrook Trunk No. 1. The proposed pipeline would be constructed parallel to the proposed access road, resulting in approximately 0.27 acres of new surface disturbance on BLM surface. Once the proposed Lybrook H03-2206 No. 01H well is completed, an associated 583.5-foot long well-tie pipeline would be constructed to transport produced natural gas to the proposed Encana Lybrook Trunk No. 1. The proposed pipeline would be constructed parallel to the proposed access road, resulting in approximately 0.11 acres of new surface disturbance on BLM surface and 0.16 acres on State of New Mexico surface.

Construction of the well-tie pipelines would consist of digging a trench with excavation equipment such as a wheel-ditcher or backhoe, laying pipe, and back filling the trench. The pipeline would be buried at least five feet deep. A 4.5-inch carbon steel pipeline manufactured to American Petroleum Institute 5L specifications would be used. The wall thickness of the pipe would be 0.156 inches. The pipe wall strength would be 42,000 pounds per square inch (PSI).

Production equipment used during the life of the wells may include a 3-phase separator - dehydrator, a meter run, 400-barrel tanks and/or smaller fiberglass or galvanized tanks for water disposal, and three (3) 400-barrel tanks for storage of produced oil. It is also likely that a compressor would be placed on the location during the life of the well. The use of compressors provides an increase in the economic life of the well increases the ultimate recovery of oil and gas from low-pressure reservoirs and prevents waste of the resource.

Farmington Field Office established environmental Best Management Practices (BMP's) will be followed during construction and reclamation of the well site pads, access roads, pipeline ties, facility placement, or any other surface disturbing activity associated with this project. Bureau wide standard BMP's are found in the Gold Book, Fourth Edition-Revised 2007. Farmington Field Office BMP's are integrated into the general and site specific stipulations.

For a detailed description of design features and construction practices associated with the proposed action, refer to the APD (attached as Appendix 7.1). Also see the subject APD for additional maps showing the proposed well locations and associated facilities described above. Implementation of committed mitigation measures contained in the Conditions of Approval (COAs) are also listed in Appendix 7.1 and incorporated and analyzed in this alternative. Site specific stipulations and mitigation measures determined at the onsite include:

- A closed-loop system would be utilized for the both proposed wells.
- Pads will be lined with a minimum 20-mil liner while drilling with oil based mud.
- Excavated materials from the leveling of the well pad areas would be used on the fill portions of the locations.
- Reclaimed slopes would be re-contoured to pre-construction topographical contours.
- Cut material from the reserve and burn pits will be stockpiled on the location or used to construct the back-walls of the burn pit.
- All disturbed areas not needed for production would be seeded with an FFO specified seed mixture.
- Above ground structures would be painted to blend with the natural color of the landscape. Paint color would be Juniper Green (Federal Standard 595a-17127).
- All cultural resource stipulations would be followed.
- Trees to be removed on the proposed Lybrook H03-2206 location would be cut and stacked on location for public firewood gathering.
- Sandstone or other available material would be used to armor the existing erosional feature bordering the proposed Lybrook A03-2206 location to the east. Also, a U.S. Army Corps of Engineers Section 404 Permit for the placement of dredge or fill material into jurisdictional waters of the U.S. may be required for construction activities to commence. It is the responsibility of the operator to obtain any necessary permits associated with the proposed action.
- No construction activities from May 15 to July 31 will be permitted without an approved migratory bird nest survey for proposed projects causing 4.0 acres or more of vegetative disturbance. Surveys will be conducted by a BLM/FFO approved biologist using a survey protocol developed by the BLM/FFO. If any active nests are located within the action area, project activities will not be permitted until written approval by a BLM/FFO biologist. The BLM/FFO may monitor any active nests located from a nest survey.
- Water acquired to construct, produce and maintain actions authorized by a permit to drill must be acquired from permitted water sources, or water authorized for use by the New Mexico Oil

Conservation Division (OCD). Upon request, the Authorized Officer (AO) shall be provided with documentation of water sources.

Table 2.2 – Proposed Well Information

Well Name	Well Number	Township	Range	Section	Footages	Lease #	Lease Issue Date
Lybrook A03-2206	01H	22N	6W	3	Surface: 827' FNL 432' FEL	NMNM 109386	12/1/2002
					BHL: 827' FNL 330' FWL		
Lybrook H03-2206	01H	22N	6W	3	Surface: 2325' FNL 138' FEL		
					BHL: 2325' FNL 330'FWL		

County: Sandoval

Applicant: Encana Oil & Gas (USA) Inc.

Surface Owner: Bureau of Land Management and State of New Mexico

2.3 Alternatives Considered But Not Analyzed In Detail
No additional alternatives have been considered and the proposed locations have been selected for the best drainage of subsurface resources while protecting surface resources to the maximum extent possible.

3.0 Description of Affected Environment

This section describes the environment that would be affected by implementation of the proposed action described in Section 2. Aspects of the affected environment described in this section focus on the relevant major resources or issues. Certain critical environmental components require analysis under BLM policy. These items are included below in Table 3.0. Following the table, only the aspects of the affected environment that are potentially impacted are described.

Table 3.0 – Affected Environment and Basis for Determination of No Further Analysis

Resource	Located in Project Area	Not in Project Area	Further Analysis Presented in Text	Basis for Determination
CRITICAL ELEMENTS OF THE HUMAN ENVIRONMENT				
Air Resources	X		X	
Areas of Critical Environmental Concern		X	X	
Cultural Resources		X	X	No significant cultural resources were located during the survey of the proposed action area (LAC Reports 2012-1f & 2012-1h).
Native American Religious Concerns		X	X	A review of existing information indicates the action is not associated with any known Traditional Cultural Property.
Environmental Justice		X	X	
Farmlands, Prime or Unique		X	X	
Floodplains		X	X	
Invasive, Non-native Species		X	X	
Threatened or Endangered Species	X			BLM/FFO review determined compliance with threatened and endangered species management guidelines outlined in the Sept. 2002 Biological Assessment for the BLM/FFO RMP. No further Section 7 ESA consultation with the USFWS is required (See above ESA paragraph, pg. 1).
Wastes, Hazardous or Solid		X	X	
Water Quality - Surface/Ground	X		X	
Wetlands/Riparian Zones		X	X	

Wild and Scenic Rivers		X		There are no Wild and Scenic Rivers in Farmington Field Office, no indirect effects are projected outside the FFO.
Wilderness		X		Action is not located within or in close proximity to any Wilderness Area or Wilderness Study Area. No indirect effects are projected.
NON-CRITICAL ELEMENTS				
General Topography/Surface Geology	X		X	
Mineral Resources	X		X	
Paleontology	X		X	
Soils	X		X	
Watershed/Hydrology	X		X	
Vegetation, Forestry	X		X	
Livestock Grazing	X		X	Proposed action is within BLM/FFO managed grazing allotment No. 5112.
Special Management Species		X	X	
Wildlife	X		X	
Wild Horse and Burros		X	X	
Recreation		X	X	
Visual Resources	X		X	Proposed project area is within 2003 RMP VRM Class IV and 2009 VRI Class IV.
Public Health and Safety		X	X	

3.1 Air Resources

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

The 2003 RMP discussed ozone in the Baseline Air Quality and Impact Assessment sections. The National Ambient Air Quality Standard (NAAQS) at the time was 0.084 ppm. In March of 2008, the Environmental Protection Agency (EPA) announced a new primary 8-hour standard of 0.075 ppm.

Increased development in the Four Corners area including a proposed new coal fired power plant, increased oil and gas development, and population growth are all contributing to air quality concerns. Many residents are concerned with potential health impacts from other pollutants. An overall haze and plume of nitrogen oxides can often been seen in the skies, which impact visibility, and there are concerns for the ecosystem due to deposition of mercury and nitrogen.

In addition, the Environmental Protection Agency (EPA), on October 17, 2006, issued a final ruling on the lowering of the National Ambient Air Quality Standard (NAAQS) for particulate matter ranging from 2.5 micron or smaller particle size. This ruling became effective on December 18, 2006, stating that the 24-hour standard for PM2.5, was lowered to 35 ug/m³ from the previous standard of 65 ug/m³. This revised PM2.5 daily NAAQS was promulgated to better protect the public from short-term particle exposure.

This EA incorporates an analysis of the contributions of the proposed action to GHG emissions, and a general discussion of potential impacts to climate.

Air quality and climate are the components of air resources, which include applications, activities, and management of the air resource. Therefore, the BLM must consider and analyze the potential effects of BLM and BLM-authorized activities on air resources as part of the planning and decision making process.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including seven nationally regulated ambient air pollutants. Regulation of air quality is also delegated to some states of which New Mexico is one. Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology and terrain, and also includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Greenhouse gases and the potential effects of GHG emissions on climate are not regulated by the EPA, however climate has the potential to influence renewable and non-renewable resource management.

3.1.1 Air Quality

The area of the proposed action is considered a Class II air quality area. A Class II area allows moderate amounts of air quality degradation. The primary sources of air pollution are dust from blowing wind on disturbed or exposed soil and exhaust emissions from motorized equipment.

Air quality in the area near the proposed wells is generally good and is not located in any of the areas designated by the Environmental Protection Agency as “non-attainment areas” for any listed pollutants regulated by the Clean Air Act. During the summers of 2000 through 2002, ozone levels in San Juan County were approaching non-attainment. Additional modeling and monitoring was conducted by Alpine Geophysics, LLC and Environ International Corporations, Inc., in 2003 and 2004. Results of the modeling suggest the episodes recorded in 2000 through 2002 were attributable to regional transport and high natural biogenic source emissions. The model also predicted that the region will not violate the ozone NAAQS through 2007 and that the trends in the 8-hr ozone values in the region will be declining in the future. At the present time, the San Juan County is classified as in attainment with the revised federal ozone standard of 0.075 ppm. Rio Arriba County is unclassified because of there are no ozone monitors sited in Rio Arriba County.

Greenhouse gases, including carbon dioxide (CO_2) and methane (CH_4), and the potential effects of GHG emissions on climate, are not regulated by the EPA under the Clean Air Act. However, climate has the potential to influence renewable and non-renewable resource management. The EPA’s Inventory of US Greenhouse Gas Emissions and Sinks found that in 2007, total U.S. GHG emissions were over 7 billion metric tons and that total U.S. GHG emissions have increased by 17% from 1990 to 2007. Emissions increased from 2006 to 2007 by 1.4 percent (99.0 Tg CO_2 Eq.). The following factors were primary contributors to this increase: (1) cooler winter and warmer summer conditions in 2007 than in 2006 increased the demand for heating fuels and contributed to the increase in the demand for electricity, (2)

increased consumption of fossil fuels to generate electricity, and (3) a significant decrease (14.2 percent) in hydropower generation used to meet this demand (EPA 2009).

The levels of these GHGs are expected to continue increasing. The rate of increase is expected to slow as greater awareness of the potential environmental and economic costs associated with increased levels of GHG's result in behavioral and industrial adaptations.

3.1.2 Climate

Global mean surface temperatures have increased nearly 1.0°C (1.8°F) from 1890 to 2006 (Goddard Institute for Space Studies, 2007). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) predicted a warming of about 0.2°C per decade for the next two decades, and then a further warming of about 0.1°C per decade. The National Academy of Sciences (2006) supports these predictions, but has acknowledged that there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures.

A 2007 US Government Accountability Office (GAO) Report on Climate Change found that, "federal land and water resources are vulnerable to a wide range of effects from climate change, some of which are already occurring. These effects include, among others: 1) physical effects such as droughts, floods, glacial melting, and sea level rise; 2) biological effects, such as increases in insect and disease infestations, shifts in species distribution, and changes in the timing of natural events; and 3) economic and social effects, such as adverse impacts on tourism, infrastructure, fishing, and other resource uses." It is not, however, possible to predict with any certainty regional or site specific effects on climate relative to the proposed action and subsequent actions.

In New Mexico, a recent study indicated that the mean annual temperatures have exceeded the global averages by nearly 50 percent since the 1970's (Enquist and Gori 2008). Similar to trends in national data, increases in mean winter temperatures in the southwest have contributed to this rise. When compared to baseline information, periods between 1991 and 2005 show temperature increases in over 95 percent of the geographical area of New Mexico. Warming is greatest in the northwestern, central, and southwestern parts of the state.

3.2 Areas of Critical Environmental Concern (ACECs)

Areas of Critical Environmental Concern (ACEC) were designated in the FFO/BLM 2003 FRMP, under authority of the FLPMA of 1976 allowing for multiple use of lands administered by the BLM. The ACEC designation pertains to "...areas within public lands where special management attention is required (when such areas are developed or used, or where no development is required) to protect and prevent irreparable damage to important historical, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards." (FLPMA 1976 Sec. 103, 43 U.S.C. 1702 et seq.).

The proposed action would not be located in any BLM/FFO designated ACEC.

3.3 Cultural Resources

The proposed action is located within the archaeologically rich San Juan Basin of northwestern New Mexico. In general, the prehistory of the San Juan Basin can be divided into five major periods: Paleo-

Indian (ca. 10000 B.C. to 5500 B.C.), Archaic (ca. 5500 B.C. to A.D. 400), Basketmaker II-III and Pueblo I-IV periods (aka Anasazi; A.D. 1-1540), and the historic (A.D. 1540 to present), which includes Native American as well as later Hispanic and Euro-American settlers. Detailed description of these various periods and select phases within each period is provided in the Bureau of Land Management Farmington Field Office Final Environmental Impact Statement (2003) and will not be reiterated here. Additional information is also included in an associated document, Cultural Resources Technical Report (CRTR; SAIC 2002).

The BLM FFO has categorized variability in archeological sites by major time period, cultural affiliations/components, average size, and occurrence of features in each of the 20 watersheds within the BLM FFO's jurisdiction (BLM 2003a:3-88). The proposed action is within the Largo watershed. Based on the CRTR, a total of 2,051 sites representing 2,815 temporal/cultural components have been documented within the watershed (BLM 2003b). Of the 19 categories of sites defined based on temporal/cultural affiliation, 17 are represented. Lacking in the watershed are sites attributed to Paleo and Ute occupations. The most frequently occurring cultural affiliations recorded are Pueblo III (ca. A.D. 1050 to 1300) and Dinétah/Gobernador Phases (ca. A.D. 1500 to 1753) period components. Features common to these sites include hearths, charcoal stains, middens, hogans, and sweat lodges.

The entire area of potential affect for the proposed action was surveyed by La Plata archaeological Consultants (LAC) at a BLM Class III level (100%) and inventory 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).

No significant cultural resources were discovered within the proposed action area (LAC Reports 2012-1f and 2012-1h).

3.4 American Indian Religious Concerns

Traditional Cultural Properties (TCPs) is a term that has emerged in historic preservation management and the consideration of Native American religious concerns. TCPs are places that have cultural values that transcend, for instance, the values of scientific importance that are normally ascribed to cultural resources such as archaeological sites. The National Park Service (Parker and King 1998:1) has defined TCPs as follows:

> A traditional cultural property can be defined generally as one (a property) that is eligible for the National Register because of its association with cultural practices or beliefs of a living community that, (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. (National Register Bulletin 38)

Native American cultural associations are the "communities" most likely to identify TCPs, although TCPs are not restricted to this group. Some TCPs are well known, while others may only be known to a small group of traditional practitioners, or otherwise only vaguely known.

There are several pieces of legislation or Executive Orders that should be considered when evaluating Native American religious concerns. These govern access and use of scared sites, possession of sacred items, protection and treatment of human remains, and the protection of archaeological resources ascribed with religious or historic importance. These include the following:

- The American Indian Religious Freedom Act of 1978 (AIRFA; 42 USC 1996, P.L. 95-431 Stat. 469).
    - ✓ Possession of sacred items, performance of ceremonies, access to sites
- Executive Order 13007 (24 May 1996).
    - ✓ Access and use of sacred sites, integrity of sacred sites
- The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA; 25 USC 3001, P.L. 101-601).

- ✓ Protection, ownership, and disposition of human remains, associated funerary objects, unassociated funerary objects, sacred objects, or objects of cultural patrimony
- The Archaeological Resources Protection Act of 1979 (ARPA; 16 USC 470, Public Law 96-95).
  - ✓ Protection or archaeological resources on Federal and Indian lands

For the proposed action, identification of TCPs were limited to reviewing existing published and unpublished literature (e.g. Valkenburgh 1941, 1974 , Brugge 1993, Kelly et al 2006), and the site-specific cultural resources survey report conducted for the Proposed Action. In addition, the BLM's cultural resources program was contacted for information regarding the presence of TCPs identified through ongoing BLM tribal consultation efforts.

A review of existing information compiled during previous land use planning efforts, existing studies, or via direct consultation indicates the proposed action is not within a known Traditional Cultural Property.

3.5 Environmental Justice
Executive Order 12898 requires federal agencies to assess projects to ensure there is no disproportionately high or adverse environmental, health, or safety effects on minority and low-income populations. Minorities comprise a large proportion of the population residing inside the boundaries of the Farmington Field Office (see pages 3-106 to 3-107 of the PRMP/FEIS for more details on ethnicity and poverty rates).

3.6 Farmlands, Prime or Unique
Several of the watersheds within the Farmington Field Office boundaries have some soils meeting the definition of prime farmland, all of which must be irrigated to produce high quality crops (BLM 2003a, pg 3-19).

The proposed action would not be located within any soil units known to contain prime or unique farmlands (BLM 2003a, pg 3-22).

3.7 Floodplains
A review of the GIS data on active and 100-year floodplains (derived from Federal Emergency Management Agency floodplain maps) indicate the proposed action is not located within any designated floodplains.

3.8 Invasive, Non-Native Species
The objective of the Farmington Field Office weed management program is to detect invasive plant species populations, prevent the spread of new invasive populations, manage existing populations using the tools of integrated weed management and eradicate invasive populations, using the safest environmental methods available. For all actions on public lands that involve surface disturbance or rehabilitation, reasonable steps would be required to prevent the introduction or spread of noxious weeds, including requirements for using weed seed–free hay, mulch and straw.

No invasive or noxious weeds were encountered during the onsite inspection of the proposed action area. BLM GIS data of known invasive or noxious weed populations indicate no known weed populations to be in or nearby the area of the proposed action area.

3.9 Wastes, Hazardous or Solid
The Resource Conservation and Recovery Act (RCRA) passed in 1976, establishes a comprehensive program for managing hazardous wastes from the time they are produced until their disposal. The U.S. Environmental Protection Agency (EPA) regulations define solid wastes as any "discarded materials" subject to a number of exclusions. A "hazardous waste" is a solid waste that is (1) is listed by the EPA as a hazardous waste, (2) exhibits any of the characteristics of hazardous wastes (ignitability, corrosivity, reactivity, or toxicity) or (3) is a mixture of solid and hazardous waste. A 1980, amendment to RCRA conditionally exempted from regulation as hazardous wastes, "drilling fluids, production waters, and other

wastes associated with the exploration, development, or production of crude oil or natural gas. On July 6, 1988, EPA determined that oil and gas exploration, development and production (ED&P) wastes would not be regulated as hazardous wastes under RCRA. A simple rule of thumb was developed for determining if an ED&P waste is likely to be considered exempt or non-exempt from RCRA regulations: If (1) the waste came from down-hole, or (2) the waste was generated by contact with the oil and gas production stream during removal of produced water or other contaminants, the waste is most likely to be considered exempt by EPA. The Comprehensive Environmental Response Compensation and Liability Act (CERCLA), passed in 1980, deals with the release (spillage, leaking, dumping, accumulation, etc.) or threat of a release of hazardous substances into the environment. Despite many oil and gas constituent wastes being exempt from hazardous waste regulations, certain RCRA exempt contaminants could be subject to regulations as hazardous substances under CERCLA. The New Mexico the Oil Conservation Division (OCD) administers hazardous waste regulations for oil and gas activities in New Mexico.

No hazardous or solid waste materials are present at the proposed project site. The notification of releases such as natural gas, natural gas liquids, and petroleum, outside a facility site is required under CERCLA and under BLM NTL-3A.

3.10 Water Quality – Surface/Ground

Availability of water quality data, like stream-flow data, is largely limited to the perennial streams in the northern part of the San Juan Basin. The water quality of the perennial streams varies from upstream to downstream and is strongly influenced by the type of rock and soils with which the water has been in contact. In the upper reaches, the perennial streams have relatively low concentrations of dissolved solids. In the middle and lower reaches, the streams contain progressively more magnesium, calcium, sodium and sulfate concentrations and vary according to flow conditions.

Quality data for the ephemeral runoff south of the San Juan River are limited to only a few observations at sampling stations associated with the USGS coal hydrology program. Ephemeral flows are generally very poor quality water due to the highly erosive and saline nature of the soils. Sparse vegetative cover and rapid runoff conditions are characteristic of the area.

There are no perennial water resources within the immediate vicinity of the proposed action area. The proposed action area is located within rolling terrain of a northeast-southwest trending ridge that separates an unnamed drainage to the north and the Venado Canyon drainage to the south. Both proposed well locations would drain northerly into the unnamed drainage that crosses Indian Service Route 46 approximately 0.4 mile north of the proposed Lybrook A03-2206 No. 01H well location. The principle unnamed drainage flows northeast and meets the Venado Canyon drainage over four miles from the proposed action area. Venado Canyon meets Cañon Largo approximately seven miles northeast of the proposed action area.

The San Juan Basin is underlain by sandstone aquifers and unconsolidated sand and gravel aquifers. The Colorado Plateau's Aquifers are sandstone while the Rio Grande Aquifer system is unconsolidated sand and gravel. The primary Colorado Plateau's Aquifers underlying the vast majority of the San Juan Basin are the Unita-Animas Aquifer and the Mesa Verde Aquifer.

The quality of groundwater in the San Juan Basin generally ranges from fair to poor. The Unita-Animas contains fresh to moderate saline water and the quality of the Mesa Verde is extremely variable. In general, areas of the aquifer that are recharged by infiltration from precipitation or surface water sources contain relatively fresh water.

The operator proposes to set surface casing to a depth of 250 feet, or as specified by the BLM, to protect any shallow aquifers. An operation plan with the proposed casing program to protect the aquifers would be submitted with the APD.

3.11 Wetlands/Riparian Zones

Field inspection of the proposed action and a review of BLM and USFWS GIS data indicate the proposed action is not located within any riparian or wetlands habitat.

3.12 General Topography/Surface Geology

The proposed project area is situated on a northeast-southwest trending ridge on the northeast fringes of Sisnathyel Mesa. The ridge separates a principle unnamed drainage to the north and Venado Canyon to the southeast. Sisnathyel Mesa is a fairly large topographical feature extending from the Continental Divide near Deer Mesa to the southeast, to the head of Escrito Canyon just southeast of Lybrook, New Mexico, a distance of nearly 13 miles. Elevation in the immediate project area ranges from 6,989 to 7,052 feet.

3.13 Mineral Resources

Federal lands in the San Juan Basin are important sources of mineral materials for construction projects in the region, including sand and gravel, rock and stone, and other fill materials. The proposed action is not located on any permitted surface mineral mining operation or free use area.

3.14 Paleontology

Fossils found on BLM-managed lands are considered part of our national heritage and afforded protection. The BLM manages fossil resources for their scientific, educational, and recreational values. On public lands paleontological resources are managed under authorities and policy's that govern the management and preservation of the resource. Paleontological resources are managed under numerous authorities including the BLM Field Office 2003 Resource Management Plan (2003b:4-117), Paleontological Resources Preservation Act of 2009 (Sections 6301-6312 of the Omnibus Public Lands Act of 2009, 16 USC 470aaa), Federal Land Policy and Management Act of 1976 (P.L. 94-579), National Environmental Policy Act of 1969 (P.O. 91-190), Potential Fossil Yield Classification System for Paleontological Resources on Public Lands (IM 2008-009), and the Assessment and Mitigation of Potential Impacts to Paleontological Resources (IM 2009-011). The authorities provide for Civil and Criminal penalties and also require that public lands be managed to preserve and protect the quality of scientific values of paleontological resources.

The proposed action is located within the paleontological rich area of the San Juan Basin of northwestern New Mexico. The BLM uses the Potential Fossil Yield Classification (PFYC) system to identify areas with a high potential to produce significant fossil resources (IM 2008-009). This system has ranked all lands within the BLM-Farmington Field Office (FFO) management acres as a Class 5 designation. Class 5 designations are described as being Very High Potential paleontological resource areas, thus requiring an assessment at the project level (IM 2008-011).

The BLM's Potential Fossil Yield Classification (PFYC, BLM 2008-009) system is a predictive modeling tool that was developed to provide baseline guidance for assessing and mitigating paleontological resources. It is intended to be used at an intermediate point in analyses and should be used to assist in determining the need for further mitigation assessment or actions. It is intended to be utilized at an intermediate point in analyses, and should be used to assist in determining the need for further mitigation assessment or actions (IM 2008-011). The PFYC is based on the fact that occurrences of paleontological resources are often closely tied to the geologic units that contain them. This classification does not reflect rare or isolated occurrences of significant fossils or individual localities, only the relative occurrence on a formation- or member-wide basis. Although, it is recognized that local differences have to be taken into account. Using the PFYC system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts.

The BLM FFO recognized eight Paleontological Special Designated Areas (SDA) in the current Resource Management Plan (more than 135,000 acres) in order to preserve important paleontological resources for scientific study, protection, and other public benefits (BLM 2003b:4-117). The BLM has determined that these areas require special management attention in order to protect, and prevent irreparable damage to

important paleontological resources. The proposed action is not located in a Paleontological SDA so additional site specific surveys, reporting, and stipulations could be required if deemed necessary by the BLM paleontology resources staff.

The proposed action is located within the San Jose Formation, a geologic unit ranked as PFYC Class 5 for very high paleontological sensitivity (BLM 2008b), which could entail project-specific assessments. The San Jose Formation of the San Juan Basin is the most extensively preserved and exposed Eocene rock-stratigraphic unit in New Mexico. The formation has yielded one of the largest and most diverse vertebrate faunas of early Eocene fossils collected in North America. Fossil plants (leafs, stems) from lacustrine strata of the Regina Member of the San Jose Formation at Santos Peak indicate a humid, forested environment in the depositional basin.

3.15 Soils

The San Juan Basin is bordered by the Defiance Uplift and Chuska Mountains to the west, San Juan Dome to the north, Chaco Slope and Zuni Uplift to the south and the Nacimiento Uplift to the east. In total, the San Juan Basin covers a surface of approximately 4,600 square miles. The soils in the San Juan Basin were formed primarily from two kinds of parent material: alluvial sediment and sedimentary rock. The alluvial sediment is material that was deposited in river valleys and on mesas, plateaus, and ancient river terraces. The material has been mixed and sorted in transport and has a wide range of mineralogy and particle size. Sedimentary parent material consists mainly of sandstone and shale bedrock. These shale and resistant sandstone beds form prominent structural benches, buttes, and mesas bounded by cliffs.

Soils in the immediate area of both proposed well locations are comprised of the Orlie-Sparham association, 0 to 5 percent slopes. This soil map unit is composed of approximately 45 percent Orlie and similar soils, 35 percent Sparham and similar soils, and five percent Riverwash. The Orlie series consists of very deep, well drained, moderately slowly permeable soils that formed in alluvium and eolian materials derived from shale and sandstone on summits of mesas, dipslopes of cuestas, hills, summits of plateaus and fan remnants on valley sides. The Sparham series consists of very deep, well drained soils that formed in alluvium and stream alluvium derived from shale and sandstone on alluvial fans on valley sides and flood plains on valley floors.

The different characteristics of these soil types are listed below in Tables 3.15.1.

Table 3.15.1

Characteristic	Sparham	Orlie
Surface Layer	Grayish brown clay loam	Pale brown loam
Slope	0-3%	0-8%
Depth	More than 80”	More than 80”
Surface Runoff	Low to high	Medium
Typical Use	Grazing, irrigated agriculture, and community development	Livestock grazing
Moisture Regime	Aridic ustic	Aridic ustic
Drainage Class	Well drained	Well drained
Available Water Cap.	High	High
Permeability	Very slow	Moderately slow

Parent Material	Alluvium derived from sandstone and shale	Slope alluvium from sandstone and shale

3.16 Watershed – Hydrology
The San Juan Basin consists of broad mesas interspersed with many deep canyons with steep canyon walls, dry washes, entrenched narrow valleys, and alluvial fans and floodplains. Elevations range from approximately 4,800 feet, where the San Juan River flows into Utah, to approximately 8,800 feet near the Jicarilla Apache land, and near 7,300 feet near Lindrith, New Mexico. The planning area is divided into watersheds based on the Hydrologic Units (4th level) delineated by the USGS. Principally, the administrative area under the jurisdiction of the Farmington Field Office consists of five of these 4th level hydrologic watershed units. These watershed units are: (1) Middle San Juan, (2) Animas, (3) Upper San Juan, (4) Blanco Canyon, and (5) Chaco. The proposed action is within the 1,690 square mile Blanco Canyon watershed containing the Carrizo Creek and Cañon Largo drainages.

3.17 Vegetation, Forestry
The proposed action is located in a transitional vegetation zone between piñon-juniper woodland found on the north slopes of Sisnathyel Mesa and within some of the drainages and Great Basin Desert scrub found in the lowland areas. Ground cover throughout the proposed Lybrook A03-2206 action area was estimated to be approximately 30 percent and dominated by sagebrush and various grasses. The sagebrush appeared to have been chemically treated for range management purposes. No trees are located within the Lybrook A03-226 action area. Ground cover throughout the proposed Lybrook H03-2206 action area was estimated to be approximately 50 percent and again dominated by sagebrush and various grasses. An outcrop of piñon and juniper trees was present around the northwest corner of the action area. Sparse ground cover throughout the entire action area consisted of blue grama grass, alkali sacaton, and broom snakeweed. Approximately ten medium-sized piñon and juniper trees would be removed as a result of the proposed action.

3.18 Livestock Grazing
There are 167 grazing allotments managed by the Farmington Field Office with 351 grazing authorizations that permit cattle, sheep, and horse grazing within the resource area. Of the 351 grazing authorizations, 317 are permitted under section 3 of the Taylor Grazing Act. Of the 167 grazing allotments, there are four authorizations issued under section 15 of the Taylor Grazing Act to the Navajo Tribe that authorizes grazing on 35 allotments. There are an additional 30 section 15 authorizations that permit grazing on 30 allotments in the Lindrith, NM area.

The proposed action is located within the BLM/FFO managed Navajo Nation grazing allotment No. 5112. The grazing allotment is operated from March 1 through February 28 annually with a maximum of 101 head of cattle.

3.19 Wild Horse and Burros
There are no areas managed for wild horse or burros within the proposed action area. The proposed action area lies over 40 miles south of the Jicarilla Wild Horse Territory. No wild horses or burros, or sign of wild horses or burros, exist nor are suspected to exist in the proposed action area.

3.20 Wildlife
Mule deer and Rocky Mountain elk are common in the proposed action area as are other common mammalian species such as the coyote, deer mouse, cottontail rabbit, and black-tailed jackrabbit. Game birds found in the area may include mourning dove. Migratory birds that may be present can include the Western bluebird, Western scrub-jay, juniper titmouse, and common raven. Principal raptors that may be seen are the golden eagle, red-tailed hawk and American kestrel. Nesting neo-tropical migratory birds could include the Western bluebird, gray vireo, violet-green swallow, and ash-throated flycatcher. No evidence of nesting birds was observed in the proposed action area at the time of field inspections. The most notable reptiles are the fence lizard, Western whiptail, and short-horned lizard.

The proposed action is not located in any BLM/FFO designated wildlife SDA.

3.21 Migratory Birds

The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC §§ 701-715s, as amended), established protections for migratory birds and their parts (i.e. eggs, nests, and feathers) from taking, hunting, capture, transport, sale, or purchase. Executive Order 13186, 66 Fed. Req. 3853, (January 17, 2001), entitled "Responsibilities of Federal agencies to Protect Migratory Birds," directed agencies to take certain actions to further implement the migratory bird conventions, the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA) and other pertinent statutes. A Memorandum of Understanding (MOU) between the US Department of the Interior Bureau of Land Management (BLM) and the US Fish and Wildlife Service (FWS) was signed on April 12, 2010, and outlines a collaborative approach to promote the conservation of migratory bird populations. The purpose of the MOU is to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds through collaboration between the BLM and FWS, in coordination with state, tribal, and local governments.

Information from the New Mexico PIF website (http://www.hawksaloft.org/pif.shtml), the New Mexico PIF highest priority list of species of concern by vegetation type, and the 2002 Birds of Conservation Concern Report for the Southern Rockies/Colorado Plateau Bird Conservation Region (BCR) No. 16, have been used to develop a list of high priority migratory bird species with potential to occur in the area of the proposed action (Tables 3.21.1 and 3.21.2).

Table 3.21.1 Species with potential to occur in Great Basin Desert Shrub community

Common Name (Scientific name)	Habitat Associations
Ferruginous hawk (*Buteo regalis*)	Inhabits dry, open country. Often hovers when foraging or soars in a dihedral. Perches in trees, on poles, on the ground.
Swainson's hawk (*Buteo swainsoni*)	Soars over open plains and prairie with uptilted wings in teetering, vulture-like flight. Gregarious, usually migrates in large flocks.
Loggerhead shrike (*Lanius ludovicianus*)	Relatively xeric habitats dominated by shrubs and grasses.
Sage thrasher (*Oreoscoptes montanus*)	Sagebrush plains.
Sage sparrow (*Amphispiza belli*)	Sagebrush-grassland habitat.
Black-throated sparrow (*Amphispiza bilineata*)	Xeric habitats dominated by open shrubs with areas of bare ground.
Gray vireo (*Vireo vicinior*)	In northwest New Mexico, found in broad-bottomed, flat or gently sloped canyons, in areas with rock outcroppings on near ridgetops.
Bendire's thrasher (*Toxostoma bendirei*)	Brushy desert, especially areas of tall vegetation, cholla cactus, creosote bush and yucca.
Mountain bluebird (*Sialia currucoides*)	Inhabits open rangelands, meadows, generally above 5,000 ft; in winter primarily found in open lowlands, desert. Nests in tree cavities and buildings.
Green-tailed towhee	Prefer high diversity of shrub species, including sagebrush,

(*Pipilo chlorurus*)	greasewood or piñon-juniper. Breeds in Great Basin shrub in the northwest quadrant of the state.
Scaled quail (*Callipepla squamata*)	Barren mesas and plateaus, semidesert scrublands, and grasslands with mixed scrub.
Vesper sparrow (*Pooecetes gramineus*)	Uncommon to fairly common in dry grasslands, farmlands, forest clearings, and sagebrush.

Table 3.21.2 Species with potential to occur in Piñon-Juniper Woodland community

Common Name (Scientific name)	Habitat Associations
Ferruginous hawk *(Buteo regalis)*	Prefers forest edge or mature, isolated, flat-topped junipers, with thick support branches for nests; in NW New Mexico, often nests on rock spires.
Montezuma quail (*Cyrtonyx montezumae*)	Uncommon, secretive and local in grassy understory of open juniper-oak or pine-oak woodlands on semi-arid mountain slopes.
Bridled titmouse (*Baeolophus wollweberi*)	Common resident of woodland stands of oak, juniper, and sycamore in mountains of New Mexico.
Juniper titmouse (*Baeolophus griseus*)	Uncommon to fairly common in juniper or piñon-juniper woodland.
Western bluebird (*Sialia mexicana*)	Nests in holes in trees, posts: common in woodlands, farmlands, orchards; in desert areas during winter, fond in mesquite-mistletoe groves.
Mountain bluebird (*Sialia currucoides*)	Inhabits open rangelands, meadows, generally above 5,000 ft; in winter primarily found in open lowlands, desert. Nests in tree cavities and buildings.
Broad-tailed hummingbird (*Selasphorus platycercus)*	Casual fall and winter to Gulf Coast.
Cassin's kingbird (*Tyrannus vociferans*)	Fairly common in varied habitats; usually prefers denser foliage and hillier country than does Western kingbird.
Gray vireo *(Vireo vicinior)*	In northwest New Mexico, found in broad-bottomed, flat or gently sloped canyons, in areas with rock outcroppings on near ridgetops.
Plumbeous vireo (*Vireo plumbeus*)	Fairly common in varied woodland habitats.
Western scrub-jay (*Aphelocoma californica*)	Interior *woodhouseii* race shy, inhabits lower mountain woodland; all subspecies hold individual territories.
Piñon jay (*Gymnorhinus cyanocephalus*)	Generally seen in large flocks, often numbering in hundreds; nests in loose colonies. Common in piñon-juniper woodlands of interior mountains and high plateaus; also yellow pine (ponderosa) woodlands.

Bendire's Thrasher *(Toxostoma bendirei)*	Brushy desert, especially areas of tall vegetation, cholla cactus, creosote bush and yucca.
Crissal thrasher (*Toxostoma crissale*)	Very secretive, hiding in underbrush. Found mainly in dense mesquite and willows along streams and washes; sometimes on lower mountain slopes.
Virginia's warbler (*Vermivora virginiae*)	Common in mountain brushlands. Rare to coastal California. Casual in the east.
Black-throated gray warbler *(Dendroica nigrescens)*	Prefers large stands of piñon-dominated woodland, often found in dense forests with a canopy.
Loggerhead shrike *(Lanius ludovicianus)*	Relatively xeric habitats dominated by shrubs and grasses.
Vesper sparrow (*Pooecetes gramineus*)	Uncommon to fairly common in dry grasslands, farmlands, forest clearings, and sagebrush.
Black-chinned sparrow (*Spizella atrogularis*)	Inhabits brushy arid slopes in foothills and mountains. Rarely seen in migration.

Sources: New Mexico Avian Conservation Partners, New Mexico Partners In Flight, 2011. National Geographic Society, *Field Guide to the Birds of North America*. 1999.

3.22 Special Management Species

In accordance with BLM Manual 6840, BLM manages certain sensitive species 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. Included in this category are state listed endangered species and federal candidate species which receive no special protections under the Endangered Species Act. Special Management Species with potential to occur in the proposed action area are listed in Table 3.22.

Table 3.22– Special Management Species of the BLM/FFO and their potential to occur in the proposed action area.

Common Name *(Scientific name)*	Status*	Habitat Associations	Presence**
BIRDS			
American peregrine falcon *(Falco peregrinus anatum)*	SMS NM-T	Nest in ledges or potholes on cliffs in wooded/forested habitats; Forage over riparian woodlands, coniferous & deciduous forests, shrublands, prairies.	NS
Ferruginous hawk *(Buteo regalis)*	SMS	Breed in open country, usually prairies, plains and badlands; semidesert grass-shrub, sagebrush-grass & piñon-juniper plant associations.	NS
Golden eagle *(Aquila chrysaetos)*	SMS	In the west, mostly open habitats in mountainous, canyon terrain. Nests primarily on cliffs and trees.	NS
Bald eagle *(Haliaeetus leucocephalus)*	SMS NM-T	Nests in forested areas adjacent to large bodies of water.	NP
Burrowing Owl	SMS	Open grasslands or desert scrub. Presence of	NP

(Athene cunicularia)		suitable nest burrow is critical prerequisite (often prairie dog burrows).	
Prairie falcon *(Falco mexicanus)*	SMS	Forages in open grassland, desert scrub, rangeland, and agricultural areas; nests in cavities and trees, and on ledges, cliffs, and power structures.	NS
Mountain plover *(Charadrius montanus)*	SMS	Lowland grasslands, sites with grassland characteristics (alkali flats, agricultural lands).	NP
Yellow-billed cuckoo *(Coccyzus americanus)*	SMS C	Breeds in large blocks of riparian woodland with dense understory vegetation.	NP
PLANTS			
Brack's hardwall cactus *(Sclerocactus cloveriae ssp brackii)*	SMS NM-E	Sandy clay strata of the Nacimiento Formation in sparse shadscale scrub (5,000-6,000 ft.).	NP
Aztec gilia *(Aliciella formosa)*	SMS NM-E	Salt desert scrub communities in soils of the Nacimiento Formation (5,000-6,000 ft).	NP
Sources: BLM 2005, New Mexico Natural Heritage Program 2005, NM Rare Plant 1999, USFWS 2007.			
Status* SMS = BLM Special Management Species C = Federal Candidate NM-E = State of NM Endangered NM-T = State of NM Threatened		**Presence**** K = Known, documented observation within project area. S = Habitat suitable and species suspected to occur within the project area. NS = Habitat suitable but species is not suspected to occur within the project area. NP = Habitat not present and species unlikely to occur within the project area.	

The proposed project area provides potential foraging habitat for the American peregrine falcon, prairie falcon, golden eagle, and ferruginous hawk. The proposed project area does not provide nesting habitat for the four raptors. No birds of prey or signs of their presence were observed during onsite inspection. The nearest recorded SMS raptor nest (golden eagle) lies approximately four miles northeast of the proposed action area.

3.23 Visual Resources

The BLM has developed a Visual Resource Management (VRM) classification system designed to maintain or enhance visual qualities and describe the different degrees of modification to the landscape. There are four VRM classes (Classes I through IV) which identify suggested degrees of allowed human modification in a landscape. Class I allows the least modification and Class IV allows the most (RMP 2003).

The 2003 RMP based interim VRM classes on a 1978-80 Visual Resource Inventory (VRI) of the BLM-FFO area (BLM-FFO Interim VRM Office Policy 2011). A VRI is a scenic quality evaluation, a visual sensitivity level analysis, and a delineation of distance zones. The 2003 VRM classifications are still implemented pended the completion of a new VRI that would meet current BLM guidance and its review (RMP 2003).

In 2009, a new VRI was completed for the BLM-FFO area. This VRI indicated that the landscape has changed substantially since the 1978-80 VRI, warranting the need for an amendment to the RMP to address visual resources. Therefore, on June 13, 2011, the BLM-FFO filed a Notice of Intent (FR Doc.

2011-14491) to prepare an RMP amendment and EA for visual resources. The BLM-FFO will continue to honor all valid, existing rights and resource allocations discussed in the RMP (BLM-FFO Interim VRM Office Policy 2011). In the interim, until the amendment has been signed, 2003 VRM and 2009 VRI classifications will both be discussed during the EA process.

The proposed action area is within 2003 VRM Management Class IV. Class IV allows for major modifications of the characteristic landscape and the level of change in the basic landscape elements due to management activities may dominate the view and be the major focus of viewer attention (RMP/FEIS 2003). The proposed action area is in 2009 VRI Class IV.

The proposed action is located in an area that is lightly industrialized with natural resource extraction. One well has been drilled within a one mile radius to the proposed action area. Mineral resources production facilities are occasional in the immediate area but are not likely noticeable to the casual observer due to mitigation measures such as area appropriate paint color. Both proposed well locations would be visible from Indian Service Route 46, and a moderate amount of traffic was documented during onsite inspection. Water hauling trucks and well service vehicles are occasionally encountered throughout the area. Pipeline and powerline ROWs are common throughout the area as well.

3.24 Recreation

The Farmington Field Office has set aside several areas for special use and manages them as Specially Designated Areas (SDA). Recreation SDA's are managed to accommodate a large variety of recreational uses and outdoor recreational experiences. Areas located outside of recreation SDAs are managed as Extensive Recreation Management Areas (ERMAs). Few recreation facilities or supervisory efforts exist on these lands and they are managed to maintain a freedom of recreation choice with limited regulatory constraints. The proposed action would not be located within a BLM/FFO designated Recreation SDA.

3.25 Public Health and Safety

All worker safety is governed by Occupational Safety and Health Administration (OSHA) safety laws and regulations. Worker safety incidents must also be reported to the BLM under the procedures of Notice to Lessee (NTL)-3A. Pipeline safety regulations are administered by OSHA as well as Department of Transportation (DOT) regulations. Pipeline safety regulations (49 CFR Parts 190 and 192) govern design, construction and operation of gas transmission lines. Any incidents involving DOT-regulated pipelines must be reported under these regulations (District 2003a).

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

Additional hazards to the general public in the proposed action area include safety hazards associated with increased traffic during the construction of the proposed well. General hazards around producing oil and gas fields such as accidental pipeline failures and moving equipment like pump jacks are potential/present in the proposed action area. Hydrogen sulfide gas is not known to be or expected to be a problem within the proposed action area.

4.0 Environmental Consequences and Proposed Mitigation Measures

No Action
Under the No Action Alternative, the proposed well would not be drilled. There would be no new impacts from oil and gas production to the resources. The No Action Alternative would result in the continuation of the current land and resource uses in the project area and is used as the baseline for comparison of alternatives.

Proposed Action
A summary of potential surface disturbance is presented in Tables 4.0.1 – 4.0.3. Descriptions of potential effects on individual resources for the proposed action are presented in the following text. Also described are potential mitigation measures that could be incorporated by the BLM where appropriate as Conditions of Approval attached to the permit.

Table 4.0.1 – Summary of Disturbance (Lybrook A03-2206 No. 01H)

Lybrook A03-2206 No. 01H		**Alternative B**		**Duration**
		Feet	Acres	
Well Pad	New Disturbance	300 x 300	2.07	Short Term
		-	0.75*	Long Term
Construction Zone	New Disturbance	1400 x 50	1.61	Short Term
Pipeline	New Disturbance	596 x 20	0.27	Short Term
Road	New Disturbance	405 x 30	0.28	Long Term
Total New Disturbance (BLM)			**4.23**	**Short Term**
			1.03	**Long Term**

Table 4.0.2 – Summary of Disturbance (Lybrook H03-2206 No. 01H)

Lybrook H03-2206 No. 01H		**Alternative B**		**Duration**
		Feet	Acres	
Well Pad and Construction Zone	New Disturbance (NM)	-	0.48	Short Term
	New Disturbance (BLM)	-	3.19	Short Term
		-	0.75*	Long Term
Pipeline	New Disturbance (NM)	349 x 20	0.16	Short Term
	New Disturbance (BLM)	234 x 20	0.11	Short Term
Road	New Disturbance (NM)	350 x 30	0.24	Long Term
	New Disturbance (BLM)	70 x30	0.05	Long Term

Total New Disturbance (NM)	**0.88**	**Short Term**
	0.24	**Long Term**
Total New Disturbance (BLM)	**3.35**	**Short Term**
	0.80	**Long Term**

* All well pads will have interim reclamation, average long-term disturbance has been determined to be approximately 0.75 acres.

Short-term impacts are those which can be stabilized or mitigated rapidly (within 5 years). Long-term impacts are those that would substantially remain for more than 5 years.

For the purpose of this EA, potential impacts have been divided into three categories:

> **High:** - as defined in CEQ guidelines (40 CFR 1500-1508), impacts which are substantial in severity and therefore should receive the greatest attention in decision-making.
> **Moderate:** - impacts that cause a degree of change that is easy to detect, but do not meet the criteria for significant impacts.
> **Low:** - impacts which cannot be easily detected, and cause little change in the existing environment.

4.1 Air Resources

4.1.1 Direct and Indirect Effects

4.1.1.1 Air Quality

Air quality would temporary be directly impacted with pollution from exhaust emissions, chemical odors, and dust that would be caused by the motorized equipment used to construct the access roads, well pads, and by the drilling rig that will be used to drill the wells. Dust dissemination would discontinue upon completion of the construction phase of the access roads and well pads. Air pollution from the motorized equipment would discontinue at the completion of the drilling phase of the operations. The winds that frequent the northwestern part of New Mexico generally disperse the odors and emissions. The impacts to air quality would be greatly reduced as the construction and drilling phases are completed. Other factors that currently affect air quality in the area include dust from livestock herding activities, dust from recreational use, and dust from use of roads for vehicular traffic.

Over the last 10 years, the leasing of Federal oil and gas mineral estate in Farmington Field Office has resulted in an average total of approximately 450 to 500 wells drilled on federal leases annually. These wells would contribute an incremental increase to the total emissions (including GHG's) from oil and gas activities in New Mexico.

Potential impacts of development could include increased air borne soil particles blown from new well pads or roads, exhaust emissions from drilling equipment, compressors, vehicles, and dehydration and separation facilities, as well as potential releases of GHG, NOx and VOCs during drilling or production activities. The amount of increased emissions cannot be quantified at this time since it is unknown how many wells might be drilled, the types of equipment needed if a well were to be completed successfully (e.g. compressor, separator, dehydrator), or what technologies may be employed by a given company for drilling any new wells. The degree of impact will also vary according to the characteristics of the geologic formations from which production occurs.

The reasonable and foreseeable development scenario developed for the Farmington RMP demonstrated 522 wells would be drilled annually for federal minerals. Current APD permitting trends within the field office confirm that these assumptions are still accurate. This level of exploration and production would contribute a small incremental increase in overall hydrocarbon emissions, including GHGs, NOx, and VOCs released into the planet's atmosphere. When compared to total national or global emissions, the amount released as a result of potential production from the proposed wells would not have a measurable effect on climate change due to uncertainty and incomplete and unavailable information; therefore is not possible to determine the effects on climate change on a regional, national, or global scale.

Consumption of oil and gas developed from the proposed wells is expected to produce GHGs, NOx and VOCs. Consumption is driven by a variety of complex interacting factors including energy costs, energy efficiency, availability of other energy sources, economics, demography, and weather or climate. Regional and global transportation, metropolitan traffic, fires (including wildfires, controlled burns, and use of domestic fire places), and power plant emissions from the west are all parts of the equation. Regional air quality modeling conducted for the Northern San Juan Basin Coal Bed Methane FEIS Project in August 2006, determined that potential cumulative visibility impacts to Federal PSD Class I Areas (Mesa Verde National Park and the Weminuche Wilderness Area) could occur at some unspecified time in the future.

The NAAQS are set for the most common and widespread pollutants. The standards are concentrations of air pollution above which the EPA has determined that serious health and welfare consequences could occur. If the concentrations are below the NAAQS, there are no expected adverse effects to humans and the environment.

4.1.1.2 Climate

The assessment of GHG emissions and climate change is in its formative phase. It is currently not feasible to know with certainty the net impacts from the proposed action on climate. The inconsistency in results of scientific models used to predict climate change at the global scale coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level. When further information on the impacts to climate change is known, such information would be incorporated into the BLM's planning and NEPA documents as appropriate.

4.1.2 Potential Mitigation

The FFO has been a participant of the Four Corners Air Quality Task Force (FCAQTF) since its inception back in 2002 when it was known as the Four Corners Ozone Task Force. Because of the unanswered questions raised by these modeling efforts, the FCAQTF has continued to look at air quality issues in the Four Corners region. The FCAQTF is comprised of a broad base of representatives including federal, state, Indian, and local governments, as well as industry, interest groups, and concerned community members. The FCAQTF has several working groups, which worked on the development of a mitigation options report (completed December 2007), to serve as a resource and guide to the regulatory agencies. The responsible agencies may use the report as the basis for developing air quality management plans for the region. This may include developing new and revising existing regulations, supporting new legislation, developing new outreach and information programs, and developing and/or expanding voluntary programs for emission reductions.

Additional air quality modeling conducted since completion of the 2003 FEIS/RMP and provisions in the ROD for the FEIS/RMP provide for applications of additional emission controls if requested by the NMAQB. Based on this modeling, the NMAQB issued an interim directive that all newly issued APDs limit compressor emissions to no more than 2 grams per horsepower hour of N_2O for engines of 300 horsepower or less. The FFO has complied with this directive through a condition of approval (COA) which has been in effect since August 1, 2005. To date, NMAQB has made no other such requests.

Currently, development on Federal minerals in New Mexico's San Juan Basin is at a lower level than forecast in the Reasonable Foreseeable Development (RFD) Scenario prepared in 2001 for the FFO EIS/RMP. The impacts forecast by the RFD are still valid. At the time the 2003 EIS/RMP was written, ozone readings did not represent a violation of the NAAQS for this pollutant. The New Mexico Environment Department Air Quality Bureau has determined that the 2007 – 2009 ozone design value for San Juan County is 0.070 ppm. The design value for the county must be greater than the revised 8-hour ozone standard of 0.075 ppm for a nonattainment designation.

The EPA's inventory data describes "Natural Gas Systems" and "Petroleum Systems" as the two major categories of total US sources of GHG gas emissions. The inventory identifies the contributions of natural gas and petroleum systems to total CO_2 and CH_4 emissions (natural gas and petroleum systems do not produce noteworthy amounts of any of the other greenhouse gases). Within the larger category of "Natural Gas Systems", the EPA identifies emissions occurring during distinct stages of operation, including field production, processing, transmission and storage, and distribution. "Petroleum Systems" subactivities include production field operations, crude oil transportation and crude oil refining. Within the two categories, the BLM has authority to regulate only those field production operations that are related to oil and gas measurement, and prevention of waste (via leaks, spills, and unauthorized flaring and venting).

The BLM's regulatory jurisdiction over field production operations has resulted in the development of "Best Management Practices" (BMPs) designed to reduce impacts to air quality by reducing all emissions from field production and operations. Typical measures may include: flare hydrocarbon and gases at high temperatures in order to reduce emissions of incomplete combustion; require that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored; placement of compressors engines 300 horsepower or less must have NOx emissions limited to 2 grams per horsepower hour; re-vegetate areas of the pad not required for production facilities to reduce the amount of dust from the pads; and water dirt roads during periods of high use in order to reduce fugitive dust emission. The significant threshold for particulate matter of 35 ug/m³ daily PM2.5 NAAQS is not expected to be exceeded under the proposed action.

The EPA data show that improved practices and technology and changing economics have reduced emissions from oil and gas exploration and development (Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006). One of the factors in this improvement is the adoption by industry of the BMPs proposed by the EPA's Natural Gas Energy Star program. The Farmington Field Office will work with industry and NMAQB to help facilitate the use of the relevant BMPs for operations proposed on federal mineral leases where such mitigation is consistent with agency policy.

4.2 Areas of Critical Environmental Concern

No effect.

4.3 Cultural Resources

4.3.1 Direct and Indirect Effects

Direct effects normally include alterations to the physical integrity of a cultural resource. If a cultural resource is significant for other than its scientific information, direct effects may also include the introduction of audible, atmospheric, or visual elements that are out of character for the cultural site. A potential indirect effect from the proposed action is the increase in human activity or access to the area with the increased potential of unauthorized removal or other alteration to cultural resources in the area. Based on a review of the archaeological reports and the assessment of the undertaking in this area, the BLM cultural resources staff has determined that the proposed action will have no effect on cultural resources. This determination will be included with the FFO/BLM cultural resources stipulations, if any, attached to the APD/R-O-W, as the case may be.

No significant cultural resources were discovered during the survey of the proposed Lybrook A03-2206 and Lybrook H03-2206 well locations (LAC Reports 2012-1f and 2012-1h).

4.3.2 Potential Mitigation

All FFO/BLM cultural resources stipulations will be followed as indicated in the Cultural Resource Records of Review, attached to the R-O-W/APD. These stipulations may include, but are not limited to temporary or permanent fencing or other physical barriers, monitoring of earth disturbing construction, project area reduction and/or specific construction avoidance zones, and employee education. All employees, contractors, and sub-contractors of the project will be informed by the project proponent that cultural sites are to be avoided by all personnel, personal vehicles, and company equipment, and that it is illegal to collect, damage, or disturb cultural resources, and that such activities are punishable by criminal and or administrative penalties under the provisions of the Archaeological Resources Protection Act (16 U.S.C. 470aa-mm).

In the event of a discovery during construction, the project proponent will 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., National Register, NAGPRA, ARPA), it will be protected in place until mitigating measures can be developed and implemented according to guidelines set by the BLM.

4.4 American Indian Religious Concerns

4.4.1 Direct and Indirect Effects

The proposed action is not known to physically threaten the integrity of any TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere or otherwise hinder the performance of traditional ceremonies and rituals pursuant to AIRFA or EO 13007. There are currently no known threats to remains that fall within the purview of NAGPRA or ARPA. Although none have been identified, any heretofore unidentified effect of the proposed action to Native American Religious Concerns is expected to be negligible in both the short and long term.

4.4.2 Potential Mitigation

No mitigation measures have been recommended for the proposed action.

4.5 Environmental Justice

4.5.1 Direct and Indirect Effects

No minority or low income populations would be directly affected in the vicinity of the proposed action. Indirect effects could include effects due to overall employment opportunities related to the oil and gas and service support industry in the region as well as the economic benefits to state and county governments related to royalty payments and severance taxes. Other effects could include a small increase in activity and noise disturbance in areas used for grazing, wood gathering, or hunting. However, these effects would apply to all public land users in the project area. A more detailed description of potential impacts is contained in the PRMP/FEIS p.4-120 and 4-129.

4.6 Farmlands, Prime or Unique

No effect.

4.7 Floodplains

No effect.

4.8 Invasive, Non-native Species

4.8.1 Direct and Indirect Effects

Weeds (invasive/non-native vegetation) can be introduced in many ways, including wind, vehicles, heavy equipment, livestock, and wildlife. The potential for weeds to invade or spread within an area is increased when native vegetation is removed and physical disturbance to the soil occurs. Establishment of weeds usually occurs in disturbed sites such as oil/gas pads, pipelines, stock water ponds, and edges of roads.

The Farmington Field Office and the operator would follow BLM policy to control and manage invasive nonnative vegetation species. There were no invasive weeds encountered during the onsite inspection of the proposed action areas.

4.8.2 Potential Mitigation

It would be the responsibility of the operator to control and eradicate all noxious/invasive weeds within the proposed action areas during the life of the project.

4.9 Wastes, Hazardous or Solid

Typical wastes associated with the proposed action would include trash, sewage, produced water, and produced hydrocarbons. During drilling and completion, a trash receptacle and a chemically treated portable toilet would be on location for trash and sewer disposal. All produced hydrocarbons would be put in tanks on location during completion work. Produced water would be put in onsite tanks or within lined reserve pits during completion work. All wastes would be disposed of in a proper manner as required by federal and state law and as described in the COAs.

When significant amounts of chemicals are stored on-site, governmental agencies would be notified as required under the Emergency Planning and Community Right to Know Act (1986). The notification of releases such as natural gas, natural gas liquids, and petroleum outside the facility site is required under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 1980, and under BLM NTL-3A. The well locations must have an informational sign, as directed under 43 CFR 3160.

4.10 Water Quality: Surface and Groundwater

4.10.1 Direct and Indirect Effects

There are no perennial water sources, springs, seeps, wetlands, or well defined ephemeral drainages within the proposed action areas. Effects to ground water resources would be low due to mitigation measures such as casing. Below casing depth, losses of produced water or mud may occur to differing degrees in various formations, but the losses are considered to be low and contained to within a few feet of the well bore. These losses are not considered to be substantial because of the very small amount of groundwater that could be affected (BLM 2003a, p. 4-14). Encana proposes to utilize closed-loop systems on both proposed wells, therefore eliminating the need for pits.

4.10.2 Potential Mitigation

Culverts, diversions, and silt traps, where indicated in the attached COA's, would be used to stabilize and reduce sediment flow. The Operator would be responsible to ensure an adequate casing program is

designed to protect ground water from contamination. Onshore Order #2 requires that all useable aquifers be protected by casing or cementing. All pits, if used, would meet State of New Mexico, Oil Conservation Division (NMOCD) pit guidelines and requirements, NMAC 19.15.17. All pits would be lined to prohibit drilling and production fluids from infiltrating into groundwater resources or flowing into surface water resources. The well pads would be lined with a minimum 20-mil liner while drilling with an oil based mud.

4.11 Wetlands/Riparian Zones

No effect.

4.12 General Topography/Surface Geology

Although there will be surface disturbance for all projects, interim reclamation and reseeding is incorporated into the project for site mitigation. No prominent topographical features would be removed or disturbed by the proposed action.

4.13 Mineral Resources

No effect.

4.14 Paleontology

4.14.1 Direct and Indirect Effects

Direct effects of the proposed project to fossil localities could result from the ground disturbing activities or the disturbance of the stratigraphic context in which they are located. Alterations to the physical integrity of bedrock or potentially fossil-yielding alluvium may occur and would have a direct effect on unidentifiable or irretrievable fossil resources. This project could also create indirect impacts to areas by changing erosion patterns. Additionally an increase in human activity in the area could increase the possibility of increased accessibility leading to looting or vandalism activities to paleontological resources in the area.

Based on a review of the paleontology report (if required) and the assessment of the undertaking in this area, the BLM paleontology resources staff has determined that the proposed action will have on effect on paleontology resources. No paleontological resources were present at the proposed project area. This determination will be included with the FFO/BLM paleontology resources stipulations, if any, attached to the APD/ROW, as the case may be.

4.14.2 Potential Mitigation

All BLM/FFO paleontological resources stipulations will be followed as indicated in the COAs, attached to the APD. These stipulations may include, but are not limited to altering the location or scope of the project or permanent fencing or other physical, temporary barriers, monitoring of earth disturbing construction, project area reduction and/or specific construction avoidance zones, and fossil recovery. If the assessment of this proposed project indicates a reasonable expectation of adverse impacts to significant paleontological resources, a field survey will be necessary to properly document and recover any fossil material and associated data. Upon review, a determination for final project clearance and stipulations shall be issued by the BLM/FFO.

The need for additional mitigation to protect paleontological resources will be determined on a case-by-case basis. The Paleontology Resource Staff, in collaboration with the Authorized Officer, will analyze the Survey Report for survey findings and determine any mitigation recommendations. If no further

mitigation is needed, the Authorized Officer should promptly notify the project proponent that there will be no additional paleontological surveys or mitigation required, and the project may proceed, pending any other approvals.

If previously undocumented paleontological sites are encountered during construction, the project proponent will immediately stop all construction activities in the immediate vicinity of the discovery. The proponent with then immediately notify the paleontological monitor (if required), or the BLM FFO paleontology resource staff. It is necessary to protect fossil material and their geological context upon discovered during construction. The BLM would then evaluate the site. Should the discovery be evaluated as significant, it will be protected in place until mitigation measures can be developed and implemented according to guidelines set by the BLM. Mitigation measures such as data and fossil recovery may be required by the BLM to prevent impacts to newly identified paleontological resources.

4.15 Soils

4.15.1 Direct and Indirect Effects

Due to the nature of drilling for mineral resources there would be soil disturbance within the proposed action locations. All areas to be disturbed would be bladed as needed to create flat surfaces for operating equipment and vehicles. Depth of soil disturbance would increase with rougher topography. Available topsoil would be stockpiled for reclamation. The cut and fill slopes on the proposed action areas would be especially susceptible to wind and water erosion until vegetation has been re-established (one to two growing seasons). The potential impacts would be dependent, in part, on seasonal variation in rainfall and snowmelt run-off, terrain, soil type, prevailing winds, and vegetative cover. The heaviest amounts of erosion will be short-term (one to two growing seasons) until the vegetation has re-established. Effects to soils would likely be low to moderate for the proposed action.

4.15.2 Potential Mitigation

Re-vegetation will reduce or minimize impacts created by water and/or wind erosion. Approximately half of the well locations and the entire well-tie pipeline disturbances would be reclaimed. The remaining surface disturbances would remain disturbed for the life of the wells for production equipment and vehicle travel surfaces. Following final down-hole plugging and abandonment of the wells, the entire well pads and access roads would be reclaimed.

Other mitigation could include culverts, diversion ditches, berms, and other such soil erosion control structures (see attached COAs). Existing dirt roadways may be re-ditched, re-crowned, or surfaced at the direction of the BLM, to minimize sedimentation.

4.16 Watershed – Hydrology

4.16.1 Direct and Indirect Effects

The proposed action would comply with water quality, quantity, and ground water protection standards under the Safe Drinking Water Act of 1974, the Clean Water Act of 1977, and the Water Quality Act of 1987, as amended. The Energy Policy Act of 2005 effectively exempted from NPDES permit requirements, storm water discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations, or transmission facilities, unless the relevant facility had a discharge of storm water resulting in a discharge of a reportable quantity of oil or hazardous substances. Currently, a Storm Water Pollution Prevention Plan for the Environmental Protection Agency (EPA) under the Clean Water Act would not be required.

The Operator would be required to comply with any future changes to the National Pollutant Discharge Elimination System permitting process for storm water discharge from construction activities enacted by the EPA prior to the completion of well construction and site stabilization.

The proposed action may require a Clean Water Act, Section 404 Permit for the discharge of dredged or fill material into jurisdictional waters of the U.S. from the United States Army Corps of Engineers (USACE), Albuquerque District. The USACE has established various Nationwide Permits authorizing actions not requiring an Individual Permit to proceed. The impacts of the proposed action to jurisdictional waters of the U.S. will be analyzed, and consultation with the USACE would take place if necessary. Operators are required to obtain all necessary permits and approvals prior to any disturbance activities.

4.16.2 Potential Mitigation

Drainage diversions would be established to divert potential storm water run-off away and around the proposed well pads. The proposed access road for the Lybrook A03-2206 well location crosses a mapped 'blue line' as shown on a USGS 7.5" topographical map, and therefore potentially impacts jurisdictional waters of the U.S. A culvert would be place in the access road along this drainage. Additionally, sandstone or a similar product would be used to armor the existing erosional feature on the east side of the proposed well location. A culvert would be place on the proposed Lybrook H03-2206 access road at the entrance to the proposed well location. A drainage diversion would be established on the southwest side of the proposed location, splitting the flow between corners two (2) and three (3). See attached COA's for specific design and implementation of drainage and diversion features.

4.17 Vegetation, Forestry

4.17.1 Direct and Indirect Effects

Direct impacts would be the removal of approximately 8.46 acres of established vegetation to construct the well pads, access roads, and well-tie pipelines for the proposed action. The proposed Lybrook A03-2206 action would remove approximately 4.23 acres of established vegetation on BLM surface. The proposed Lybrook H03-2206 would remove approximately 4.23 acres of established vegetation, including the removal of approximately ten medium-sized piñon and juniper trees; 3.35 acres on BLM surface and 0.88 acres on State of New Mexico surface. Indirect impacts would be the remaining long-term (20-30 years) disturbance of the well locations used for production equipment and vehicle driving surfaces. The removal of vegetation is projected to have low effects on the general vegetation as the species of plants to be removed are widespread and abundant in the proposed action area and throughout the San Juan Basin.

4.17.2 Potential Mitigation

Under the proposed action, upon the completion of the construction and drilling phases and the wells being placed into service, the rehabilitation and reseeding of the unused portions of the well pads and pipelines would occur. Those surfaces used for production equipment and vehicle travel would be reclaimed as directed by the conditions of approval (COA's) after final abandonment of the wells. Trees to be removed would be cut, de-limbed, and stacked for public firewood gathering.

4.18 Livestock Grazing

4.18.1 Direct and Indirect Effects

The proposed action is located within the BLM/FFO managed Navajo Nation grazing allotment No. 5112. The grazing allotment is operated from March 1 through February 28 annually with a maximum of 101 head of cattle. There would be a temporary loss of approximately 8.46 acres of potential forage under the

proposed action prior to rehabilitation and reseeding. Long-term disturbance is anticipated to be approximately 2.07 acres, a negligible reduction of AUMs.

4.18.2 Potential Mitigation

Mitigation measures associated with soils, water, riparian habitat, and wildlife serve to lessen impacts to the rangeland components essential for rangeland health. Under the proposed action, upon the completion of the construction and drilling phases and the wells being placed into service, the rehabilitation and reseeding of the unused portions of the well pads and pipelines would occur. A seed mixture specified by the BLM/FFO would be used in reclamation and would include native species developed to improve rangeland health. Those surfaces used for production equipment and vehicle travel would be reclaimed as directed by the conditions of approval (COA's) after final abandonment of the wells.

4.19 Wild Horse and Burros

No effect.

4.20 Wildlife

4.20.1 Direct and Indirect Effects

Some temporary displacement of wildlife could occur during the construction, drilling, and completion phases of the project. Potentially affected species include the Rocky Mountain elk, cottontail rabbit, black-tailed jackrabbit, mule deer, coyote, and other species that typically utilize such habitat.

The proposed action would remove 8.46 acres of potential habitat for such species. There are approximately 435,500 acres of Great Basin Desert scrub habitat and 633,400 acres of piñon-juniper woodland in the BLM/FFO planning area (BLM 2003a: 3-31). Habitat in the proposed action area is not unique to the planning area and is common throughout the northern half of the planning area. Effects to wildlife would be low for oil and gas development that adheres to proper conditions of approval.

4.20.2 Potential Mitigation

Standard mitigation measures to protect or restore wildlife habitat can be found in the RMP (December 2003) pages 2-25 and 2-26. All construction activities would be confined to permitted areas only. Rapid and permanent vegetation and cover re-establishment would minimize impacts to wildlife. All hazards associated with construction and operation of the proposed action would be fenced or contained in storage tanks.

4.21 Migratory Birds

4.21.1 Direct and Indirect Effects

Adult migratory birds would not be directly harmed by the proposed action because of their mobility and ability to avoid areas of human activity. Any nests within the area of the proposed action may be directly impacted, along with eggs and juveniles. The increased human presence during construction, drilling, and reclamation activities may indirectly disturb or displace adults from nests and foraging habitats for a short period of time, three months or less. Long term production operations would result in only a slight increase in human activity in the immediate proposed action area. Effects to the population status of migratory birds are not anticipated due to the mobility of individuals and the abundance of adjacent habitat for these species. In consideration of these factors, there would be low short-term effects to migratory birds, and minimal long-term effects as a result of the proposed action.

Potentially affected migratory bird species listed by New Mexico Partners in Flight as high priority for management include ferruginous hawk, gray vireo, gray flycatcher, Bendire's thrasher, and black-throated gray warbler for piñon-juniper woodland habitat; and Bendire's thrasher, sage thrasher, loggerhead shrike, sage sparrow, burrowing owl, and green-tailed towhee for Great Basin Desert scrub habitat. Wildlife and bird species may lose nesting/den/burrow habitat and foraging habitat.

4.21.2 Mitigation Measures

Project mitigation measures are designed to minimize effects on migratory birds and other wildlife. These measures include netting of any permanently open pits and vent caps on all open pipes to prevent bird entry and nesting. All construction activities would be confined to permitted areas only. Rapid and permanent vegetation and cover re-establishment would minimize impacts to migratory birds. All hazards associated with construction and operation of the proposed action would be fenced or contained in storage tanks.

Best Management Practices (BMPs) would be used to avoid or minimize the possibility of the unintentional take of migratory birds, as instructed in the MBTA Washington Office Interim Management Guidance and BLM/FFO Interim Management Policy (MOU No. NM-F00-2010-001). A migratory bird nest survey is required on projects creating 4.0 or more acres of new surface disturbances within the FFO district. No construction activities between May 15 and July 31 will be permitted without written approval from the BLM/FFO. The survey must be completed by a BLM/FFO approved biologist using the protocol developed by the BLM/FFO. If any active nests are located within the proposed project area, project activities will not be permitted without written approval and/or monitoring by the BLM/FFO.

4.22 Special Management Species

4.22.1 Direct and Indirect Effects

The proposed project area provides potential foraging habitat for the American peregrine falcon, prairie falcon, golden eagle, and ferruginous hawk. There would be a temporary loss of potential foraging habitat for the four raptor species prior to rehabilitation and reseeding. The proposed action would not result in any direct effect on the four raptors or their nests or roosts. Increases in noise and activity would be minimal and consistent with current activities in the area. The proposed action is not within a 1/3 mile buffer zone to any raptor nests.

4.22.2 Potential Mitigation

Standard conditions of approval designed to protect wildlife, including migratory birds and fish, and plants would serve to protect Special Management Species (see Appendix 7.1). All construction activities would be confined to permitted areas only. Rapid and permanent vegetation and cover re-establishment would minimize impacts to wildlife. All hazards associated with construction and operation of the proposed action would be fenced or contained in storage tanks.

4.23 Visual Resources

4.23.1 Direct and Indirect Effects

Visual resource impacts would be high in the short-term during construction and drilling as both proposed locations are highly visible from Indian Service Route 46. Drilling rigs, workers, and other equipment would be present and visible for approximately one to two weeks. Upon completion of construction, drilling, and interim reclamation, the continued operation of the proposed action would result in moderate long-term visual impacts. Long term visual impacts would include occasional service vehicle traffic, and portions of the well pad and surface equipment required for the continued operation of the well. Long-term

effects would be moderate as the surrounding area is lightly developed with oil and gas facilities, and pipeline and powerline ROWs. The proposed action would not be visible from any residential or recreation areas.

4.23.2 Potential Mitigation

Mitigation designed to comply with BLM/FFO VRM class and RMP management objectives will be consistent with the Surface Operating Standard and Guidelines (Gold Book), Production Operations BMP's, and VRM BMP's. During the construction phase of the proposed action, activities would be confined to the allowed disturbance area and would not migrate outside of the construction zone. Vehicles and equipment would utilize existing access roads and disturbed areas. A rapid construction schedule would minimize impacts to visual resources that result from construction activities and would reduce the period of greatest visual impact. Rapid interim reclamation and re-vegetation, and appropriate above ground equipment paint color would potentially minimize the visual impact of the proposed action.

4.24 Recreation

4.24.1 Direct and Indirect Effects

The proposed action is located in a somewhat remote area. The proposed actions at the well sites may affect recreation activities and the general recreational experience of the public through increased noise, dust, visual changes to the landscape (see Section 4.17 above), and a general increase in human activity in the area. The proposed activity would decrease the solitude of the immediate area. The general public may encounter heavy construction and drilling vehicles within the immediate areas of the well sites, as well as along the access road (Indian Service Route 46) to the proposed action area.

The recreational user may observe new surface disturbances, drilling activities, and additional energy production equipment in the immediate action area. However, the proposed action would be less noticeable as there are existing wells, ROWs, and other industry infrastructure in the area. The proposed action would be consistent with the existing environment.

4.24.2 Potential Mitigation

Equipment on the proposed action would be painted Juniper Green (Federal Standard 595a-17127) to help blend in with the surrounding scenery. Disturbed areas would be quickly re-contoured, reclaimed, and seeded with an BLM/FFO specified seed mixture. These measures will decrease the visual effects to the recreating public. Standard conditions of approval designed to protect wildlife and migratory birds would serve to limit effects to the activities of recreationally important animal species (see Appendix 7.1).

4.25 Public Health and Safety

4.25.1 Direct and Indirect Effects

The proposed action is located in a somewhat remote, however along a somewhat heavily traveled road, Indian Service Route 46. Effects to public safety would be moderate for the short-term as both proposed well locations are adjacent to this road, and would include increased traffic risks and encountering heavy equipment in the immediate area. Long-term effects would be low following construction and drilling phases of the project, and would include increased traffic risks, chemical spills, pipeline failures, and equipment accidents.

4.25.2 Potential Mitigation

The operator is responsible for the proper training and the health of its employees. Occupational Safety and Health Administration (OSHA) safety laws and regulations, BLM Notice to Lessee (NTL)-3A, pipeline safety regulations 49 CFR Parts 190 and 192, the Emergency Planning and Community Right to Know Act (1986), and CERCLA 1980, amongst other legislation, have been enacted to ensure the health and safety of workers and the public at large. A well location must have an informational sign, as directed under 43 CFR 3160.

5.0 Cumulative Impacts

The leased area of the proposed action has not been heavily industrialized with mineral resource extraction development, and the proposed wells are exploratory in nature. Throughout the San Juan Basin, the surface disturbance for each project that has been permitted has created a spreading out of land use fragmentation. The cumulative impacts fluctuate with the gradual reclamation of well abandonments and the creation of new additional surface disturbances in the construction of new access roads and well pads. The on-going process of restoration of abandonments and creating new disturbances for drilling new wells gradually accumulates as the minerals are extracted from the land and new extraction technologies are employed. Preserving as much land as possible and applying appropriate mitigation measures will alleviate the cumulative impacts.

Due to the absence of regulatory requirements to measure GHG emissions and the variability of oil and gas activities on federal minerals, it is not possible to accurately quantify potential GHG emissions in the affected areas as a result of approving this application for permit to drill. A general assumption, however, can be made: drilling these wells may contribute to GHG emissions.

The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts. However, potential impacts to natural resources and plant and animal species due to climate change are likely to be varied, including those in the southwestern United States. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils. Cool season plant species' spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened/endangered plants may be accelerated.

Due to loss of habitat or competition from other species whose ranges may shift northward, the population of some animal species may be reduced or increased. Less snow at lower elevations would likely impact the timing and quantity of snowmelt, which, in turn, could impact water resources and species dependent on historic water conditions. Forests at higher elevations in New Mexico, for example, have been exposed to warmer and drier conditions over a ten year period. Should the trend continue, the habitats and identified drought sensitive species in these forested areas and higher elevations may also be more affected by climate change.

6.0 Consultation/Coordination

This section includes individuals or organizations from the public, public land users, the interdisciplinary team, and permittees that were contacted during the development of this document.

Table 6.0 – Summary of Public Contacts Made During Preparation of Document and Interdisciplinary Team

Public Contact	Title	Organization	Present at Onsite?
ID Team Member	**Title**	**Organization**	**Present at Onsite?**
Craig Willems	Environmental Protection Specialist	BLM	YES
Brenda Linster	Regulatory Advisor	Encana Oil & Gas (USA)	YES
Jason Eckman	Field Regulatory Analyst	Encana Oil & Gas (USA)	YES
Jason Edwards	Third Party Contractor	NCE Surveying	YES
Steven Fuller	Third Party Contractor	La Plata Archaeological Consultants	YES
Johnny Stinson	Third Party Contractor	Adobe Construction	YES
Matthew Zabka	Third Party Contractor	Adkins Consulting	YES
Consultation	**Title**	**Organization**	**Present at Onsite?**
Jim Copeland	Senior Archaeologist	BLM	NO
John Hanson	Wildlife specialist	BLM	NO
John Kendall	T&E specialist	BLM	NO
Sarah Scott	Natural Resource Specialist / Riparian Coordinator	BLM	NO
Jeff Tafoya	Rangeland Management Specialist	BLM	NO
Barney Wegener	Air Quality Specialist	BLM	NO
Dale Wirth	Branch Chief, Range & Multiple Resources	BLM	NO

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7.0 Appendices

7.1 APD/COA

See attachment. The APD and COAs contain additional information about the proposed action including maps of all facilities, roads, pipelines, power lines, etc.

7.2 Authorities

Code of Federal Regulations (CFR)
40 CFR All Parts and Sections inclusive Protection of Environment, Revised as of July 1, 2001.
43 CFR, All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2000.

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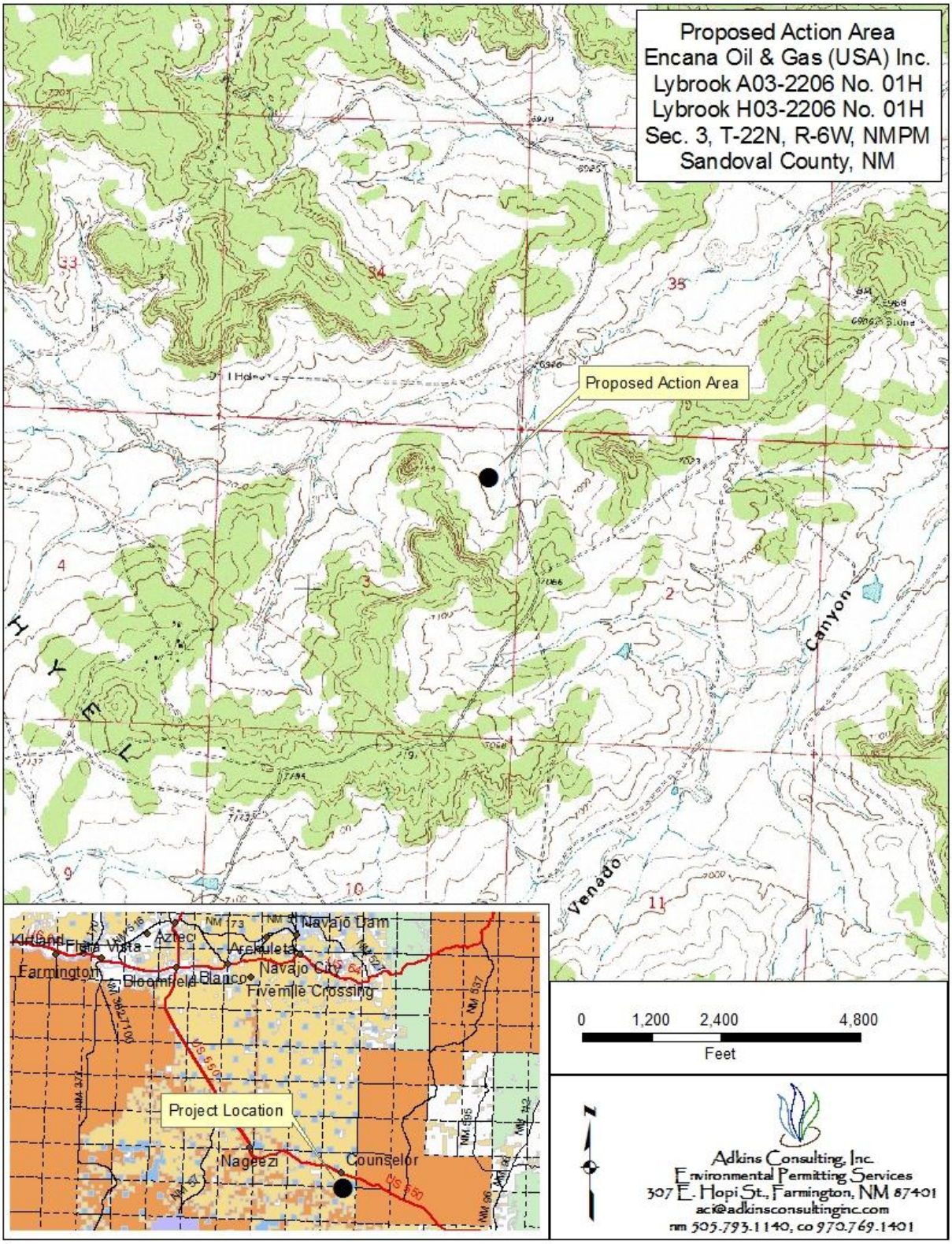
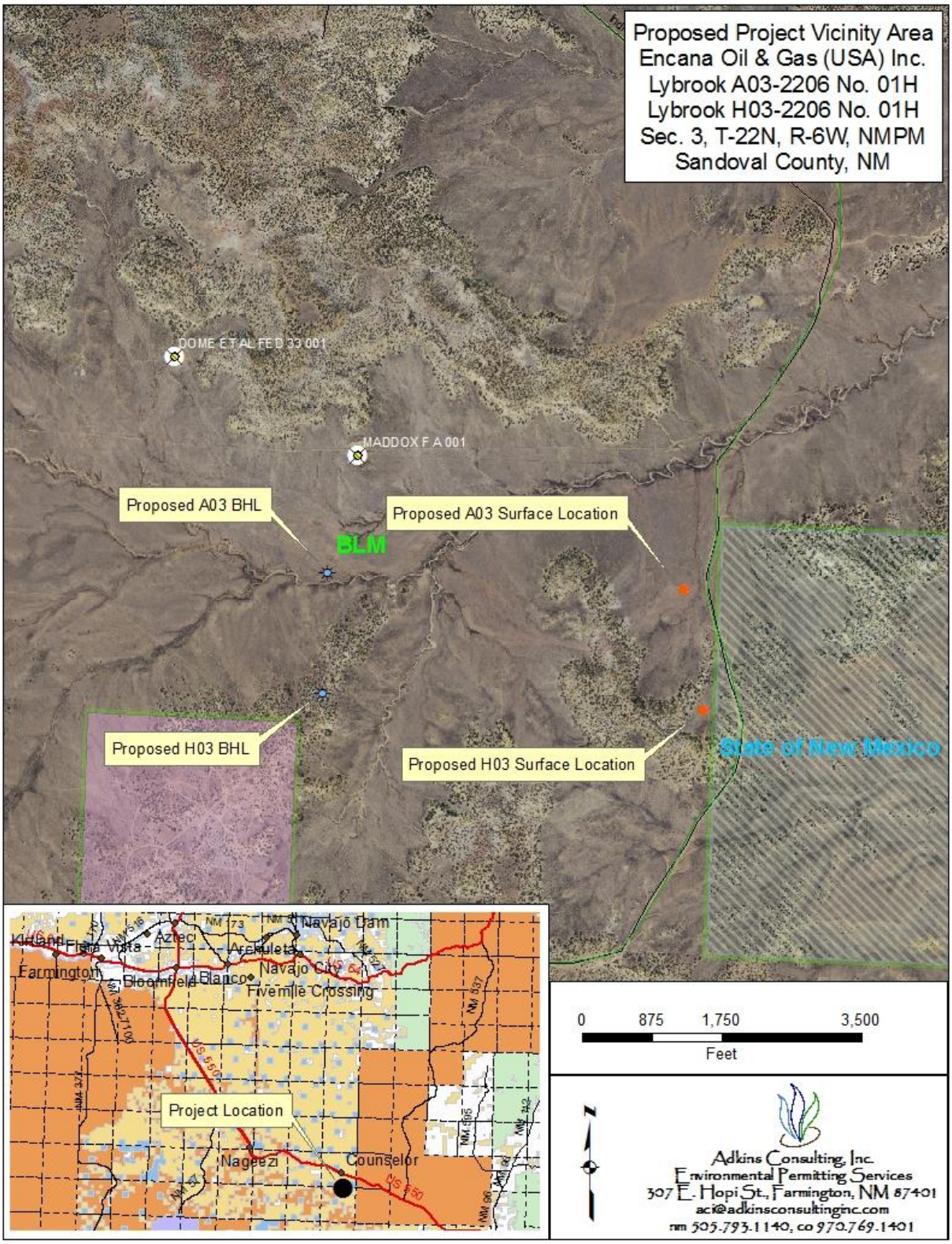
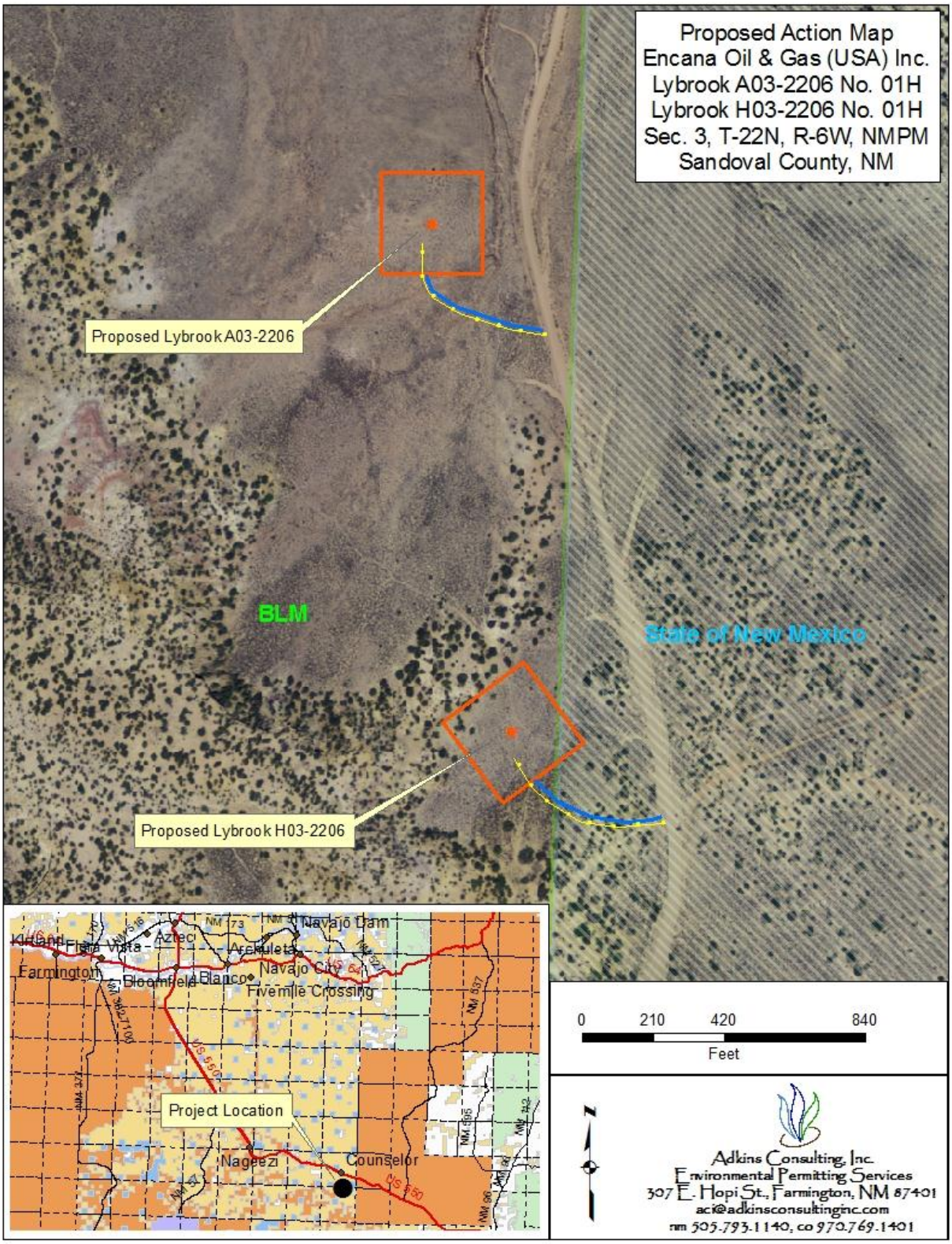
7.3 Proposed Project Area Map



7.4 Proposed Project Vicinity Map



7.5 Proposed Action Map