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Encana Oil & Gas (USA) Inc.

Escrito E07-2409
&
Escrito M07-2409

Oil & Natural Gas Well Project

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U.S. Department of the Interior
Bureau of Land Management
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1.0 Introduction

1.1 Background

A representative of Encana Oil & Gas (USA) Inc. (Encana) filed an Application for a Permit to Drill (APD) with the Bureau of Land Management, Farmington Field Office (BLM/FFO), for the proposed Escrito E07-2409 and Escrito M07-2409 oil and natural gas well projects. The proposed well pads would each contain two exploratory (wildcat) wells targeting liquid (oil) reserves within the Bisti Lower - Gallup Pool of the Mancos Shale Formation. The horizontal drilling technique utilized by Encana is relatively new to the San Juan Basin and utilizes a foam hydraulic fracturing method minimizing the excessive use of fresh water. The proposed surface disturbances are located in the west half of Section 7, Township 24 North, Range 9 West, on BLM-managed surface. The proposed wells would develop federal minerals in Sections 11 and 12, Township 24 North, Range 10 West, in San Juan 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.).

1.2 Purpose and Need

The purpose for the proposal is to provide Encana with reasonable access to their mineral lease. The need for the action is established by the BLM's responsibility under the Mineral Leasing Act to respond to the Application for Permit to Drill (APD). 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 wells.

1.3 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]. This EA is in conformance with the management goals set forth in the Resource Management Plan (RMP) for the Farmington Field Office (FFO) of the BLM, which was approved by the Record of Decision (ROD) signed September 29, 2003, and updated in December 2003 (BLM 2003b). Specifically, this action is in conformance with the following objective: It is the policy of the BLM to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs, consistent with national objectives of an adequate supply of minerals at reasonable market prices. At the same time, the BLM strives to ensure that mineral development is carried out in a manner that minimizes environmental damage and provides for the rehabilitation of affected lands (2003b, 2-2). The PRMP/FEIS, RMP, and ROD are available for review at the BLM Farmington Field Office, 6251 College Blvd., Ste. A, Farmington, NM, or electronically at:

http://www.nm.blm.gov/ffo/ffo_home.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.

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

1.4.1 Clean Water Act

Recognizing the potential for the continued or accelerated degradation of the Nation's waters, the U.S. Congress enacted the Clean Water Act, formerly known as the Federal Water Pollution Control Act (33 U.S.C. 1344), in 1977. The objective of the Act is to maintain and restore the chemical, physical, and biological integrity of the waters of the United States.

Under Section 402 of the 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 activities (between one and five acres disturbance) permit may be required. However, gas and oil activities have been exempt from NPDES permitting regulations in New Mexico.

Section 404 of the Act authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into the waters of the United States, including wetlands. It would be the proponent's responsibility to obtain all necessary permits prior to project implementation.

1.4.2 Endangered Species Act

The Endangered Species Act (ESA) of 1973 requires all federal departments and agencies to conserve threatened, endangered, and 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 action alternatives and determined they 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.

1.4.3 National Historic Preservation Act

Compliance with Section 106 responsibilities of the National Historic Preservation Act of 1966 are adhered to by following the BLM – New Mexico 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.

1.4.4 Air Resources

The FFO has been a participant of the Four Corners Air Quality Task Force (FCAQTF) since its inception 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, tribal, 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" sub-activities 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 disturbed areas not required for production facilities to reduce the amount of dust; and water dirt roads during periods of high use in order to reduce fugitive dust emission.

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.

1.4.5 Paleontological Resources

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 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.

1.4.6 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.

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. No hazardous or solid waste materials are present

within the project area. 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.

1.4.7 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 a facility site is required under the Comprehensive Environmental Response Compensation and Liability Act, 1980 (CERCLA) and under BLM NTL-3A. A well location must have an informational sign, as directed under 43 CFR 3160.

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

1.5 Scoping, Public Involvement, and Issues

The Farmington Field Office (FFO) publishes a NEPA log for public inspection. This log contains a list of proposed and approved actions in the field office. The log is located on the BLM New Mexico website (http://www.blm.gov/nm/st/en/prog/planning/nepa_logs.html). No public comments were received for this proposed action.

The project was circulated among FFO resource specialists. Internal scoping through a BLM (Interdisciplinary Team) IDT generated resource issues pertinent to the proposed project.

Potential issues include:

- What would be the effect of the alternatives on air resources/air quality?
- What would be the effect of the alternatives on archaeological/cultural resources?
- How would the alternatives affect soils?
- What would be the effect of the alternatives on water resources within the analysis area?
- How would the alternatives affect the natural vegetation/plant communities in the analysis area?
- How would the alternatives affect the livestock grazing allotment(s) within the analysis area?
- What would be the effect of the alternatives on migratory bird habitat?
- What would be the effect of the alternatives on FFO-designated SMS flora and fauna?

Additionally, the Operator is required to:
· Comply with all applicable Federal, State 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 applicable.

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 and associated access roads in order to horizontally drill and develop federal minerals administered by the BLM/FFO. The proposed project area can be accessed by traveling south on U.S. Highway 550 from Bloomfield, New Mexico, and southwest on New Mexico Route 57. The proposed well pads are located in the west half of Section 7, Township 24 North, Range 9 West, in San Juan County. New surface disturbance for the proposed project would be approximately 13.93 acres on BLM-managed surface.

To gain access to the proposed E07 well pad, Encana would construct a 225-foot road. Encana would also construct a 193-foot road to gain access to the M07 well pad. The new access roads would be developed with an average clearing width of 30 feet and to BLM Gold Book standards. Culverts may be placed at the entrance to the well pads and along the access road length as necessary to provide for the proper drainage of potential surface water run-off within the action area. Approximately 1,250 feet of existing road would be upgraded as part of the proposed project. New surface disturbance as a result of new access road construction would be approximately 0.30 acres.

The proposed well pads would both be 400 feet by 430 feet with an additional 50-foot temporary construction buffer zone on all four sides. The E07 pad would require between 2 and 8 feet of cut on the west side of the location, and between 3 and 8 feet of fill on the east side of the location. The M07 pad would require between 4 and 10 feet of cut along the west side of the location, and 23 feet of fill at corner five. Corner five of the proposed M07 well pad would be rounded to avoid excessive surface disturbance. The construction buffer zone may be used to stockpile topsoil or vegetative material that would be utilized later during reclamation. Production pits, if used, would be lined and meet State of New Mexico, Oil Conservation Division (NMOCD) pit guidelines and requirements, NMAC 19.15.17. Cut and fill slopes would be returned to the original contour upon reclamation. New surface disturbance as a result of well pad construction would be approximately 12.18 acres.

Following the final layout and construction of the well locations, drainages and diversions would be established to drain potential surface water run-off around and away from the pad. During interim reclamation, the placement of silt traps, diversion ditches, culverts, and other necessary hydrological BMP's would eliminate excessive erosion of exposed surfaces.

Once the proposed wells are completed and are determined to be viable, Encana would construct well-tie pipelines to transport produced natural gas from each location. The E07 well-tie would be approximately 920 feet in length and would be constructed cross-country, initially tying to an existing Dugan Production pipeline. The M07 well-tie would be approximately 2,071 feet in length and would be constructed parallel to proposed and existing roads, initially tying to an existing Enterprise pipeline. If gas volumes are sufficient, Encana has proposed a long-term tie for the E07 and M07 wells to the proposed Encana Escrito Trunk No. 1. The well-tie pipelines would be constructed within an off-lease 40-foot Right-of-Way (ROW) granted by the BLM/FFO. New surface disturbance as a result of well-tie pipeline construction would be approximately 1.46 acres.

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 well-tie would be up to 6-inch

outside diameter buried steel pipeline with a maximum allowable operating pressure (MAOP) of 500 pounds per square inch gauge (psig).

The trenchline, or ditch, will be excavated and sloped in accordance with Occupational Safety and Health Administration (OSHA) specifications. The cover from top of pipe to ground level will be a minimum of 36 inches through typical soil and rock and a minimum depth of 48 inches at road crossings. Where rock is encountered, tractor-mounted mechanical rippers or rock trenching equipment may be used to facilitate excavation. Excavated material will be stockpiled at the edge of the workspace. Based on field conditions, gaps will be made in subsoil stockpiles to allow for wildlife crossing and to avoid ponding or excessive diversion of natural runoff during storm events. Wildlife escape ramps will be constructed every 300 feet of open ditch. The ramps will be cut down and through the ditch resulting in a slope exiting either side of the ditch no steeper than a 5:1 ratio. The ramps will be a minimum of 10 to 12 feet wide.

The trenching operation will be followed by pipe installation, which will include stringing, bending for horizontal or vertical angles in the alignment, welding pipe segments together, inspection, coating joint areas to prevent corrosion, and lowering-into the trench. Inspection will be conducted to verify that minimum cover is provided; the trench bottom is free of rocks, debris, etc.; external pipe coating is not damaged; and the pipe is properly fitted and installed into the ditch. Fine soil will then be sifted from the excavated subsoil to provide rock-free pipeline padding and bedding. In rocky areas, padding material or a rock shield will be used to protect the pipe. Backfilling will begin after a section of the pipe has been successfully placed in the ditch and final inspection has been completed.

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 400-barrel tanks for storage of produced oil. It is also likely that a compressor would be placed on location during the life of the wells. The use of compressors provides an increase in the economic life of the wells, increases the ultimate recovery of 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 Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, Fourth Edition-Revised 2007 (The Gold Book). 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 APDs (attached as Appendix 7.1). Also see the subject APDs 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.

Table 2.2.1 – Proposed Escrito E07-2409 No. 01H Well Information

Property Name	Well Number	Township	Range	Section	Footages	Lease Number
Escrito E07-2409	01H	24N	9W	7	Surface: 1640’ FNL 262’ FWL	
			10W	12	Point-of-Entry: 1070’ FNL 330’ FEL	NM NM-112955 (01/01/2005)
				11	End-of-Lateral: 1070’ FNL 2265’ FEL	

Table 2.2.2 – Proposed Escrito E07-2409 No. 02H Well Information

Property Name	Well Number	Township	Range	Section	Footages	Lease Number
Escrito E07-2409	02H	24N	9W	7	Surface: 1670’ FNL 262’ FWL	
			10W	12	Point-of-Entry: 2270’ FNL 330’ FEL	NM NM-112955 (01/01/2005)
				11	End-of-Lateral: 2270’ FNL 2265’ FEL	

Table 2.2.3 – Proposed Escrito M07-2409 No. 01H Well Information

Property Name	Well Number	Township	Range	Section	Footages	Lease Number
Escrito M07-2409	01H	24N	9W	7	Surface: 1026' FSL 503' FWL	
			10W	12	Point-of-Entry: 1980' FSL 330' FEL	NM NM-112955 (01/01/2005)
					End-of-Lateral: 1980' FSL 330' FWL	

Table 2.2.4 – Proposed Escrito M07-2409 No. 02H Well Information

Property Name	Well Number	Township	Range	Section	Footages	Lease Number
Escrito M07-2409	02H	24N	9W	7	Surface: 1017' FSL 475' FWL	
			10W	12	Point-of-Entry: 660' FSL 330' FEL	NM NM-112955 (01/01/2005)
					End-of-Lateral: 660' FSL 330' FWL	

County: San Juan, New Mexico

Applicant: Encana Oil & Gas (USA) Inc., Denver, Colorado

Surface Management: Bureau of Land Management, U.S. Department of the Interior

Administrative Agency: Bureau of Land Management, Farmington (NM) Field Office

Prior to the development of this document, onsite inspections of the proposed project area were conducted by representatives of NCE Surveys, La Plata Archaeological Consultants, BLM, Encana, Adkins Consulting, and Adobe Contractors. Design features that were agreed upon during onsite inspections and surveys include the following:

- All construction and/or maintenance resulting in surface disturbance would be done in accordance to the BLM Surface Operating Standards and Guidelines for Oil and Gas Development, Fourth Edition-Revised 2007 (The Gold Book). Construction design practices could include culverts, diversion ditches, berms, and other such soil erosion control structures. Additional hydrological BMP's would be installed where needed to maintain drainages along access roads and within the action area (see attached COA's). Excavated materials from the cuts on the proposed well location would be used on the fill portions. Reclaimed slopes would be re-contoured to pre-construction topographical contours.
- Encana has applied for a Right-of-Way (ROW) for the off-lease portions of the proposed project located in Section 7, Township 24 North, Range 9 West. The proposed wells would be developing federal minerals in Sections 11 and 12, Township 24 North, Range 10 West.
- If used, pits would meet State of New Mexico, Oil Conservation Division (NMOCD) pit guidelines and requirements, NMAC 19.15.17.
- Grazing permittees must be notified when construction is scheduled to begin. All hazards to livestock would be fenced or contained. All project activities would be confined to permitted areas only. All areas not needed for production equipment or vehicle travel surfaces would be seeded upon reclamation. No livestock improvements will be affected.
- If any construction and/or maintenance resulting in surface disturbance are scheduled to begin within the typical migratory bird breeding season of May 15 to July 31, an approved nest survey must be conducted. Project activities would not be authorized without approval from the FFO. Construction design features and BMPs are intended to minimize effects on migratory birds. 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 reestablishment 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.
- The dominant vegetation community within the analysis area is sagebrush. The proponent has chosen the following seed mixture for reclamation purposes: fourwing saltbush (*Atriplex canescens*), winterfat (*Krascheninikova lanata*), Indian ricegrass (*Achnatherum hymenoides*), sand dropseed (*Sporobolus cryptandrus*), galletagrass (*Hilaria jamesii*), Siberian wheatgrass (*Agropyron fragile*), small burnet (*Sanguisorba minor*), and blue flax (*Linum lewisii*). Re-vegetation will reduce or minimize impacts created by water and/or wind erosion to exposed surfaces. Approximately half of the well locations and the entire well-tie pipeline disturbances would be reclaimed, totaling approximately 12.13 acres. The remaining surface disturbance (approximately 1.8 acres) 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.
- Above ground structures would be painted to blend with the natural color of the landscape. Paint color would be Covert Green.
- All FFO 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.

- 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.
- The operator proposes to set surface casing to a depth of 500 feet to protect any overlying freshwater aquifers. An operation plan with the proposed casing program to protect these resources would be submitted with the APDs.
- All BLM/FFO paleontological resource 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 proposed action 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 proposed project is not located within an FFO-designated paleontological SDA.
- The operator shall ensure that dust abatement measures be taken on all applicable roadway surfaces, as the potential for high volumes of heavy truck traffic exists.
- Noise stipulations will be enforced on all activities associated with the proposed project. Various private facilities, including a dormitory, rehabilitation clinic, and a religious institution, are located within 0.25-mile of the proposed Escrito E07-2409 project area.

2.3 Alternatives Considered But Not Analyzed

The E07 was originally staked approximately 200 feet to the south of the proposed location, but was relocated due to the presence of cultural resources in the project area. The M07 was originally staked as the L07, approximately 400 feet north of the proposed location. The L07 was relocated to the south to minimize excessive visual impacts on the private facilities located along NM Route 57. The proposed well 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 alternatives 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 above in Section 1.5.

3.1 Air Resources

The proposed wells are located in San Juan County, New Mexico. Additional general information on air quality in the area is contained in Chapter 3 of the Farmington PRMP/FEIS. In addition, new information about greenhouse gases (GHGs), and their effects on national and global climate conditions has emerged since this document was prepared. On-going scientific research has identified the potential impacts of GHG emissions such as carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), water vapor, and several trace gases on global climate. Through complex interactions on a global scale, GHG emissions may cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and burning of fossil carbon sources have caused GHG concentrations to increase measurably, and may contribute to overall climatic changes, typically referred to as global warming.

Much of the information referenced in this section is incorporated from the Air Resources Technical Report for BLM Oil and Gas Development in New Mexico, Kansas, Oklahoma, and Texas (herein referred to as Air Quality Technical Report; USDI/BLM 2011b). This document summarizes the technical information related to air resources and climate change associated with oil and gas development and the methodology and assumptions used for analysis.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including seven nationally regulated ambient air pollutants (criteria 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

Criteria Air Pollutants

The Air Quality Technical Report describes the types of data used for description of the existing conditions of criteria pollutants, how the criteria pollutants are related to the activities involved in oil and gas development, and provides a table of current national and state standards (USDI/BLM 2011b). The EPA Green Book web page reports that all counties in the analysis area, San Juan, McKinley, Rio Arriba, and Sandoval Counties in New Mexico, and La Plata County, Colorado, are in attainment of all National Ambient Air Quality Standards (NAAQS) as defined by the Clean Air Act. The area also does not violate any New Mexico Ambient Air Quality Standards (NMAAQS). The current criteria pollutant concentrations in the analysis area are described below. Total emissions of criteria pollutants from each source sector were calculated by adding together the emissions from San Juan, McKinley, Rio Arriba, and Sandoval Counties.

Table 3.1.1 shows monitoring values for ozone in recent years for each of the three San Juan County ozone monitoring stations.

Table 3.1.1. Reported Ozone Values for San Juan County Ozone Monitoring Stations

State Air Monitoring Station	8-hour Ozone Design Value (ppm[1])			NAAQS[2]
	2007-2009	2008-2010	2009-2011	2008
Substation	0.067	0.063	0.063	0.075
Bloomfield	0.061	0.060	0.061	0.075
Navajo Lake	0.069	0.066	0.068	0.075

Source: NMED 2012
(1) parts per million
(2) NAAQS – National Ambient Air Quality Standards

Table 3.1.23.1.2 summarizes monitored values for other criteria pollutants in San Juan County.

Table 3.1.2. Criteria Pollutant Concentrations Monitored Values in San Juan County

Pollutant	Range of Design Values	Averaging Time	Observation Period	NAAQS[1]	NMAAQS[2]
NO_2 [3]	7-16 ppb[4]	Annual	2005-2010	53 ppb	50 ppb
NO_2	37-50 ppb	1-hour	2005-2010	100 ppb	None
CO [5]	4.6-10.6 ppm[6]	1-hour	1990-2000	35 ppm	13.1 ppm
CO	1.7-5.2 ppm	8-hour	1990-2000	9 ppm	8.7 ppm
PM_{10} [7]	15-116[8] µg/m^3 [9]	24-hour	1990-2011	150 µg/m^3	150 µg/m^3 [9]
$PM_{2.5}$ [10]	4.3-6.6 µg/m^3	Annual	2000-2010	15 µg/m^3	60 µg/m^3 [9]
$PM_{2.5}$	10-15 µg/m^3	24-hour	2000-2010	35 µg/m^3	None
SO_2 [11]	0.001-0.002 ppm	Annual	2005-2010	None	0.02 ppm
SO_2	5-40 ppb	1-hour	2008-2010	75 ppb	None
SO_2	0.002-0.004 ppm	24-hour	2005-2010	None	0.01 ppm

Source: USDI/BLM 2011*b*
(1) NAAQS – National Ambient Air Quality Standards
(2) NMAAQS – New Mexico Ambient Air Quality Standards
(3) NO_2 – Nitrogen dioxide
(4) ppb – parts per billion
(5) CO_2 – carbon dioxide
(6) ppm – parts per million
(7) PM_{10} – particulate matter within an aerodynamic diameter equal or less than 10 microns
(8) These values represent the maximum values.
(9) µg/m3 – micrograms per cubic meter
(10) $PM_{2.5}$ – particulate matter within an aerodynamic diameter equal or less than 2.5 microns
(11) SO_2 – sulfur dioxide

In 2005, the EPA estimated that there was less than 0.01 ton per square mile of lead emitted in the analysis area, which is less than 2 tons total (USDI/BLM 2011*b*). Lead emissions are not an issue in this area and will not be discussed further.

Updates to the NAAQS since the Farmington PRMP/FEIS include a change to the ozone standard and the addition of hourly standards for nitrogen dioxide (NO_2) and sulfur dioxide (SO_2). The most significant change relevant to this analysis is the NO_2 hourly standard of 100 parts per billion (ppb). The form of the standard is the 3-year average of the annual 98th percentile of the daily 1-hour maximum. The design value is a statistic that describes the air quality status of a given area relative to the NAAQS. The analysis area is in attainment for the NO_2 hourly standard.

Hazardous Air Pollutants

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

3.1.2 Climate

The analysis area is located in a semiarid climate regime typified by dry windy conditions and limited rainfall. Summer maximum temperatures are generally in the range of 80 or 90 degrees Fahrenheit (°F), and winter minimum temperatures are generally in the teens to 20s. Temperatures occasionally reach above 100°F in June and July and have dipped below zero in December and January. Precipitation is divided between summer thunderstorms associated with the southwest monsoon and winter snowfall as Pacific weather systems drop south into New Mexico. Table 3.1.3 shows climate normals for the 30-year period from 1981 to 2010 for the Farmington, New Mexico, area.

Table 3.1.3. Climate Normals for the Farmington Area, 1981-2010

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

Source: USDI/BLM 2011*b*; data collected at New Mexico State Agricultural Science Center - Farmington
(1) degrees Fahrenheit

3.2 Cultural Resources

The proposed project 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: PaleoIndian (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 documented, Cultural Resources Technical Report (CRTR; SAIC 2002).

Cultural sites vary considerably, and can include but are not limited to simple artifact scatters, domiciles of various types with a myriad of associated features, rock art and inscriptions, ceremonial/religious features, and roads and trails. Traditional Cultural Properties (TCP's; Parker and King 1998) are a separate class of cultural resources and 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, and may or may not coincide with archaeological sites.

The entire area of potential affect for the proposed project 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). For the proposed project, identification of traditional cultural properties (TCPs) were limited to reviewing existing published and unpublished literature (e.g. Van Valkenburgh 1941, 1974; Brugge 1993; Kelly et al 2006), and the site-specific Class III survey report prepared 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.

The Class III inventory identified one cultural sites within the APE (LAC Reports 2012-1ss, 2012-1ss#2, 2012-1tt; BLM 2012(IV)045F, 2012(IV)074F, 2013(I)062F). The site (LA 124873) is recommended eligible for nomination to the National Register of Historic Places (NRHP),

Both actions are located in the vicinity of a location known as *Ts'ah To* (Sagebrush Spring). This area is only vaguely defined as a *possible* location for a spring which is mentioned in Navajo traditional history. No springs were encountered during the course of the cultural resource surveys.

3.3 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.

According to the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) Web Soil Survey, soils in the analysis area are comprised of the Doak-Sheppard-Shiprock association, Fruitland-Persayo-Sheppard complex, and the Blancot-Notal association.

The Doak-Sheppard-Shiprock association is composed of approximately 40 percent Doak and similar soils, 30 percent Sheppard and similar soils, and 20 percent Shiprock and similar soils. The Doak series consists of very deep, well drained, moderately slowly permeable soils that formed in eolian and fan alluvium from sandstone and shale. Doak soils are on cuesta dipslopes, mesas, plateaus, and fan remnants on valley sides. The Sheppard series consists of very deep, somewhat excessively drained soils that formed in eolian material derived from sandstone. Sheppard soils are on structural benches, alluvial fans, dunes on structural benches, and terraces. The Shiprock series consists of very deep, well drained and somewhat excessively drained, moderately rapidly permeable soils that formed in eolian material and alluvium, fan alluvium, and slope alluvium derived from sandstone and shale on summits of mesas, and plateaus, cuestas, fan remnants and fan terraces on valley sides and sideslopes of hills.

The Fruitland-Persayo-Sheppard complex is composed of approximately 40 percent Fruitland and similar soils, 30 percent Persayo and similar soils, and 25 percent Sheppard and similar soils. The Fruitland series consists of very deep, well drained and somewhat excessively drained soils that formed in eolian material and moderately coarse textured alluvium and stream alluvium derived from sandstone and shale. Fruitland soils are on stream terraces on valley floors, alluvial fans on valley sides, and summits of mesas. The Persayo series consists of shallow and very shallow, well drained soils on hills, terraces, and ridges. These soils formed in thin sediments weathered from underlying soft sedimentary bedrock. The Sheppard series consists of very deep, somewhat excessively drained soils that formed in eolian material derived from sandstone. Sheppard soils are on structural benches, alluvial fans, dunes on structural benches, and terraces.

The Blancot-Notal association is composed of approximately 55 percent Blancot and similar soils, and 25 percent Notal and similar soils. The Blancot series consists of very deep, well drained soils that formed in alluvium and fan alluvium from shale and sandstone. Blancot soils are on valley sides and ridges. The Notal series consists of very deep, well drained, sodium affected soils that formed in alluvium, stream alluvium, and fan alluvium derived from shale, siltstone, and sandstone. Notal soils are on low stream terraces on valley floors and alluvial fans on valley sides, fan terraces and small depressions of undulating plateaus.

The different characteristics of these soil types are listed in the tables below.

Table 3.3.1

Characteristic	Doak	Sheppard	Shiprock
Surface Layer	Light yellowish brown fine sandy loam	Reddish yellow fine sand	Light yellowish brown fine sandy loam
Slope	1-6%	0-60%	0-15%
Depth	More than 80”	More than 80”	More than 80”
Surface Runoff	Low to medium	Negligible to low	Very low to low
Typical Use	Livestock grazing, urban development, and irrigated cropland	Livestock grazing	Livestock grazing and irrigated farmland
Moisture Regime	Ustic aridic	Typic aridic	Typic aridic
Drainage Class	Well Drained	Somewhat excessive	Well drained
Available Water Cap.	High	Low	Moderate
Permeability	Moderate	Rapid	Moderately rapid
Parent Material	Alluvium derived from sandstone and shale and/or eolian deposits derived from sandstone and shale	Eolian deposits over mixed alluvium	Eolian deposits over alluvium derived from sandstone

Table 3.3.2

Characteristic	Fruitland	Persayo	Sheppard

Surface Layer	Brown sandy loam	Light yellowish brown silty clay loam	Reddish yellow fine sand
Slope	0-30%	1-50%	0-60%
Depth	More than 80”	5-20”	More than 80”
Surface Runoff	Very low to medium	Medium to high	Negligible to low
Typical Use	Irrigated cropland and livestock grazing	Native pastureland	Livestock grazing
Moisture Regime	Typic aridic	Aridic	Typic aridic
Drainage Class	Well drained	Well drained	Somewhat excessive
Available Water Cap.	Moderate	Very low	Low
Permeability	Moderate	Moderate	Rapid
Parent Material	Fan alluvium derived from sandstone and shale	Residuum weathered from shale	Eolian deposits over mixed alluvium

Table 3.3.3

Characteristic	Blancot	Notal
Surface Layer	Pale brown loam	Pale brown silty clay loam
Slope	0-8%	0-5%
Depth	More than 80”	More than 80”
Surface Runoff	Medium	High
Typical Use	Rangeland	Livestock grazing and limited irrigated agriculture
Moisture Regime	Ustic aridic	Typic aridic
Drainage Class	Well drained	Well drained
Available Water Cap.	High	Low
Permeability	Moderate	Very slow
Parent Material	Fan alluvium derived from sandstone and shale	Stream alluvium derived from sandstone and shale

3.4 Water Resources

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. 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 located within the Upper San Juan watershed.

There are no perennial surface water resources within the analysis area. The principle drainage within the vicinity of the project area is Gallegos Canyon, which drains most of the Bisti Oil Field area, including Navajo Tribal Trust surface managed by the Navajo Agricultural Products Industry (NAPI), north into the perennial San Juan River over 30 miles north of the project area. The proposed well pads are situated in gently rolling terrain approximately 2 miles southeast of the head of the Gallegos Canyon drainage. No ground water resources are anticipated to be affected by the proposed development.

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) has jurisdiction over “waters of the U.S.”. These jurisdictional waters include those that have a “significant nexus” to traditional navigable waters. Determining jurisdiction and/or significant nexus can be a time consuming process, therefore the BLM/FFO assumes the USACE has jurisdiction over any U.S. Geological Survey (USGS) watercourse (i.e., “blue line” on USGS 1:24,000 topographic maps). The proposed actions would not impact any “blue line” watercourses as documented on the USGS Blanco Trading Post, NM 7.5-minute series topographic map.

3.5 Vegetation

The analysis area contains a sagebrush-dominant Great Basin Desert scrub vegetation community. Dominant vegetation consists of sagebrush (*Seriphidium tridentatum*), blue grama (*Bouteloua gracilis*), broom snakeweed (*Gutierrezia sarothrae*), galleta (*Hilaria jamesii*), rabbitbrush (*Chrysothamnus nauseosus*), and New Mexican prickly pear cactus (*Opuntia phaeacantha*). Ground cover was estimated to be approximately 35 percent. No invasive, non-native plants listed by the BLM/FFO were documented in the analysis area.

3.6 Livestock Grazing

The proposed project is located within the FFO-managed Blanco Trading Post grazing allotment No. 5081. The grazing allotment is approximately 7,763 acres in size. Table 3.6 lists the details of the allotment.

Table 3.6. Details of the Blanco Trading Post Allotment in the proposed project area.

Allottee	Livestock Number	Livestock Type	Period Begin Date	Period End Date	% Public Land/AUMS
BLANCETT, RICHARD AND BLANCETT, EDWARD R.	CATTLE	177	11/1	6/30	72%

3.7 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. The Migratory Bird Treaty Act implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful.

Executive Order 13186 (EO) was signed on January 10, 2001 directing executive departments and agencies of the federal government to take certain actions to further implement the Migratory Bird Treaty Act. Section 3 of the EO directed each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement, within 2 years, a Memorandum of Understanding (MOU) with the Fish and Wildlife Service (Service) that shall promote the conservation of migratory bird populations. Section 3 (c) of the EO states that the MOU shall recognize that the agency may not be able to implement some elements of the MOU until such time as the agency has successfully included them in each agency’s formal planning process (such as revision of agency land management plans) including public participation and NEPA analysis, as appropriate.

A National MOU to promote the conservation of migratory bird populations between BLM and the Service was not completed during the development of the revised RMP. Consultation on the Biological Assessment (BA) with the Service for the RMP was completed on October 2, 2002, the Environmental Impact Statement (EIS) was completed in March 2003, and the Record of Decision (ROD) for the RMP was signed in September of 2003. There are no management constrains or mitigation measures pertaining to the Migratory Bird Treaty Act listed within the RMP, BA, EIS, or ROD. There are no applicable mitigation measures pertaining to the MBTA to attach to proposed actions.

A National MOU between BLM and the Service was signed on April 4, 2010. Section XI (I) of the MOU states that the BLM may not be able to implement all elements of this MOU upon signature of the MOU. Incorporation of all elements of the MOU into land use planning will be facilitated by land use plan maintenance, amendment, or revision. In February 2010, the BLM/FFO developed a Migratory Bird Policy (BLM/FFO Instruction Memorandum No. NM-F00-2010-001) in anticipation of the National MOU. This management policy establishes a consistent approach for addressing migratory bird populations and their habitat when making project level implementation decisions.

Information from the New Mexico Avian Conservation Partners website (http://nmpartnersinflight.org), the New Mexico Partners In Flight 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 migratory bird species with potential to occur in the analysis area in the following table.

Table 3.7.1 Migratory bird Species of Concern with potential to occur in the analysis area.

Common Name (Scientific name)	Habitat Associations	Presence*
Sage sparrow (*Amphispiza belli*)	Sagebrush-grassland habitat.	K
Black-throated sparrow (*Amphispiza bilineata*)	Xeric habitats dominated by open shrubs with areas of bare ground.	S
Western scrub-jay (*Aphelocoma californica*)	Interior *woodhouseii* race shy, inhabits lower mountain woodland; all subspecies hold individual territories.	S
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.	S
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.	NS
Scaled quail (*Callipepla squamata*)	Barren mesas and plateaus, semidesert scrublands, and grasslands with mixed scrub.	NS
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.	S
Loggerhead shrike (*Lanius ludovicianus*)	Relatively xeric habitats dominated by shrubs and grasses; occurs in many lowland habitats statewide.	S
Sage thrasher (*Oreoscoptes montanus*)	Summer residents in northwest NM, extending east to Taos and south to Mount Taylor and, locally, to the	S

	northern Plains of San Agustin. In winter, this species is present in desert scrub habitats in southern NM as well as piñon-juniper north to the Manzano mountains.	
Green-tailed towhee (*Pipilo chlorurus*)	Prefer high diversity of shrub species - sagebrush, greasewood or piñon-juniper. Breeds in Great Basin shrub in the northwest quadrant of the state.	NS
Vesper sparrow (*Pooecetes gramineus*)	Uncommon to fairly common in dry grasslands, farmlands, forest clearings, and sagebrush scrub.	S
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.	NS
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.	NS
Black-chinned sparrow (*Spizella atrogularis*)	Regularly occurs in appropriate habitat across the central and southern parts of NM, west of the plains. Breeding records extend north to Taos County, San Miguel County, and probably San Juan County. The species is uncommon at best in winter in southwest New Mexico	NS
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.	S
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.		

Sources: New Mexico Avian Conservation Partners, Partners-In-Flight (nmpartnersinflight.org); National Geographic Society, *Field Guide to the Birds of North America*. 1999; NatureServe Explorer: An on line Encyclopedia of Life, www.natureserve.org.

3.8 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 analysis area are listed in Table 3.8.

Table 3.8 – Special Management Species of the BLM/FFO and their potential to occur in the analysis area.

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Common Name (*Scientific name*)	Status*	Habitat Associations/Distribution	Presence**
BIRDS			
American peregrine falcon (*Falco peregrinus anatum*)	SoC SMS NM-T	Nest in ledges or potholes on cliffs in wooded/forested habitats; forage over riparian woodlands, coniferous & deciduous forests, shrublands, prairies; breed locally in mountains	NS

		and river canyons of western New Mexico east to the Sangre de Cristo, Sandia/Manzano, and Sacramento mountains. The species is a rare winter visitor in lowlands statewide.	
Ferruginous hawk (*Buteo regalis*)	SMS	Occur in open areas containing broad expanses of prairie grassland or shrub-steppe vegetation. Breed in open country, usually prairies, plains and badlands across the northern two-thirds of the state, and may be found statewide during winter; also found in semi-desert grass-shrub, sagebrush-grass & piñon-juniper plant associations. Breeding generally occurs north from Clovis in the eastern plains, north from San Antonio in the Rio Grande valley, and north from the Plains of San Agustin in the western part of the state.	S
Golden eagle (*Aquila chrysaetos*)	SMS	Typically forage in open grassland or shrubland habitat, and tend to avoid agricultural areas. Resident in all western states, with a breeding range extending east into the Great Plains. U.S. populations increase in winter with the arrival of migrants from northern breeding areas. In the west, inhabit mostly open areas in mountainous, desert canyon terrain. Nest primarily on cliffs and in trees; breed locally in suitable habitat throughout NM.	S
Prairie falcon (*Falco mexicanus*)	SMS	Inhabit arid plains and steppes at all elevations, wherever cliffs or bluffs are present for nesting. Breeds across much of western North America, from southern Canada south to central Mexico and from interior portions of the Pacific states east to the Dakotas, eastern Colorado and New Mexico, and west Texas. In winter, the range extends further east, and west to the Pacific coast. Prairie Falcon is sparsely distributed in New Mexico, but may occur in appropriate habitat statewide.	NS
Sources: BLM 2005, New Mexico Natural Heritage Program 2005, NM Rare Plant 1999, USFWS 2007			
Status* SMS = BLM Special Management Species SoC = USFWS Species of Concern 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.	

The analysis area provides potential foraging habitat for golden eagle and ferruginous hawk. It is not suspected that the American peregrine falcon or prairie falcon would occur within the analysis area. Historically documented ferruginous hawk and golden eagle nests have been documented in the vicinity, and therefore it is suspected that these raptors may utilize the analysis area as foraging habitat. The analysis area does not provide nesting habitat for any raptors. No birds of prey or signs of their presence were observed in the analysis area during onsite inspections.

4.0 Environmental Consequences and Proposed Mitigation Measures

No Action

Under the No Action Alternative, the proposed wells would not be drilled, nor would the proposed well-tie pipelines or access roads be constructed. There would be no new impacts from oil and gas production or exploration to the resources in the analysis area. The No Action Alternative would result in the continuation of the current land and resource uses in the analysis area and is used as the baseline for comparison of alternatives.

Proposed Action

A summary of potential surface disturbance is presented in Table 4.0.1. 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

Facility		Proposed Development		Duration
		Feet	Acres	
Escrito E07-2409	Well Pad	400 x 430	3.95	Short Term
		-	0.75*	Long Term
	Construction Zone	1,860 x 50	2.14	Short Term
	Access Road	225 x 30	0.16	Long Term
	Well-tie Pipeline	674 x 40	0.62	Short Term
Escrito M07-2409	Well Pad	400 x 430	3.95	Short Term
		-	0.75*	Long Term
	Construction Zone	1,860 x 50	2.14	Short Term
	Access Road	193 x 30	0.14	Long Term
	Well-tie Pipeline	1,836 x 20	0.84	Short Term
Total New Disturbance			**13.94**	**Short Term**
			1.80	**Long Term**

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

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.

4.1 Air Resources

Methodology and assumptions for calculating air pollutant and greenhouse gas emissions are described in the Air Resources Technical Report (USDI/BLM 2011b). This document incorporates the sections discussing the modification of calculators developed by the BLM to address emissions for one horizontal oil well. The calculators give an approximation of criteria pollutant, HAP, and greenhouse gas (GHG) emissions to be compared to regional and national emissions levels (USDI/BLM 2011b). Also incorporated into this document are the sections describing the assumptions used in developing the inputs for the calculator (USDI/BLM 2011b).

4.1.1 Direct and Indirect Effects

Criteria Pollutants

Table 4.1.1 shows estimated emissions from one proposed horizontal oil well for criteria pollutants, volatile organic compounds (VOCs), and greenhouse gases. For comparison, Table shows total human-caused emissions for each of the counties in the FFO and La Plata County, Colorado, based on USEPA's 2008 emissions inventory (USEPA 2011).

Table 4.1.1. Criteria Pollutant and VOC Emissions Estimated for Construction of One Horizontal Oil Well

Equipment Type	Horse-power	Hours Operated/ Day	Days to Completion	Total Hours	NO_X (1) (tons)	CO (2) (tons)	VOC (3) (tons)	CH_4 (4) (tons CO_{2eq}) (5)	CO_2 (6) (tons)
Construction									
Pad and Road Construction									
Dozer	175	10	4-6	40-60	.03-.04	.03-.03	.01-.01	.21-.21	3.67-5.51
Blade/ Track Hoe	150	10	4-6	40-60	.02-.04	.01-.01	0-0	0-.21	2.95-5.15
Drilling Operations									
Main Deck Engine	1,000	24	18-20	432-480	1.71-1.90	.43-.48	.12-.14	.002-.002	176.6-196.3
Mud Pump	1,100	24	18-20	432-480	1.51-1.68	.44-.49	.11-.12	.002-.002	222.2-246.9
Auxiliary Pump Engine	600	8	15-20	120-160	.23-.31	.07-.09	.02-.03	.006-.008	33.67-44.9
Generators (2)	300 total	24	10-15	240-432	.43-.77	.12-.21	.04-.07	.001-.001	63.1-113.6
Completion Operations									
Main Deck Engine	600	11	7-9	77-99	.09-.12	.03-.03	.01-.01	.002-.002	13.5-17.4
Auxiliary Pump Engine	225	8	5-7	40-56	.03-.04	0-0	0-0	0-0	4.21-5.89
Power Swivel	150	8	4-6	32-48	.02-.02	0-0	0-0	0-0	2.08-3.16
Generator	55	12	10-14	120-168	.02-.04	.02-.02	0-0	0-0	3.22-4.50
Interim Reclamation									

Dozer	175	10	4-6	40-60	.03-.04	.02-.03	.01-.01	0-0	3.67-5.51
Blade/ Track Hoe	150	10	4-6	40-60	.03-.04	.01-.01	0-0	0-0	3.44-5.16
Truck		6 trips	50 miles/trip	300 miles	.01	0	0	0	.013
Totals					**4.16-5.05**	**1.18-1.40**	**1.04-1.29**	**.221-.435**	**532.5-654.1**
Operations									
Annual Operations									
Pickup Truck Traffic		20 miles	12	240 miles/ year	0.00	0.00	0.00	0.00	0.126
Oil Haul Truck Traffic per bbl (7) Produced		20 miles	5	100 miles/ year	0.0004	0.0002	0.00	0.00	0.956
Final Reclamation									
Dozer	175	10	4-6	40-60	.03-.04	.02-.03	.01-.01	0-0	3.67-5.51
Blade/ Track Hoe	150	10	4-6	40-60	.03-.04	.01-.01	0-0	0-0	3.44-5.16
Truck		6 trips	50 miles/trip	300 miles	.01	0	0	0	.13
Total					**.07-.09**	**.03-.04**	**.01-.01**	**0**	**8.35-11.9**

(1) NO_X – nitrogen oxides
(2) CO – carbon monoxide
(3) VOC – volatile organic compounds
(4) CH4 – methane
(5) CO2eq – carbon dioxide equivalent
(6) CO_2 – carbon dioxide
(7) bbl – billions of barrels

Table 4.1.2. Analysis Area Emissions in Tons/Year, 2008

County	NO_X (1)	CO (2)	VOC (3)	PM_{10} (4)	$PM_{2.5}$ (5)	SO_2 (6)
McKinley	12,595.0	31,885.2	37,509.0	66,590.7	6,977.5	1,659.8
Rio Arriba	4,276.6	27,352.9	45,841.5	46,321.6	4,746.2	89.1
San Juan	35,651.7	54,549.5	46,994.9	69,655.7	8,108.3	11,471.0
Sandoval	4,780.1	33,290.5	31,733.6	36,232.3	4,056.3	123.4
Total	**57,303.4**	**147,078.1**	**160,079**	**218,800.3**	**23,897.3**	**13,343.3**

Source: EPA 2008 National Emissions Inventory (http://www.epa.gov/ttn/chief/net/2008inventory.html)
(1) NO_X – nitrogen oxides
(2) CO – carbon monoxide
(3) VOC – volatile organic compounds
(4) PM_{10} – particulate matter with an aerodynamic diameter equal to or less than 10 microns
(5) $PM_{2.5}$ – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
(6) SO_2 – sulfur dioxide

Table 4.4.1.3 displays the percent increase in total emissions in the analysis area from the proposed action to construct and operate one horizontal oil well.

Table 4.1.3. Percent Increase in Analysis Area Emissions from the Proposed Action

	NOX [1]	CO [2]	VOC [3]	PM_{10} [4,5]	$PM_{2.5}$ [5,6]	SO_2 [5,7]
Total Emissions	57,303.4	147,078.1	160,079.0	218,800.3	23,897.3	13,343.3
Horizontal Oil Well Emissions	5.41	1.4	2.0	3.47	0.35	0.51
Percent Increase	**.0009**	**.000009**	**.00001**	**.00002**	**.00001**	**.00004**

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

Hazardous Air Pollutants

The formulas used for calculating HAPs in the calculators are very imprecise. For many processes it is assumed that emission of HAPs will be equivalent to 10 percent of VOC emissions. Therefore, the HAP emissions reported here should be considered a very gross estimate. The calculator estimates that a total of 0.051 tons/year of HAPs would be emitted during construction, drilling, and first year of operation of a proposed horizontal oil well in the San Juan Basin.

Total Greenhouse Gases

The available statewide GHG summary (NMED 2010) combines GHG emissions from CO_2 and CH_4. To compare the GHG emissions from the Proposed Action estimated by the calculator with statewide GHG emissions, CO_{2eq} emissions of both CH_4 and CO_2 were summed. The total statewide GHG emission estimate for 2007 was 76,200,000 metric tons CO_{2eq} (76.2 million metric tons; NMED 2010). The estimated CO_{2eq} metric tons emissions from one horizontal oil well (312.5) would represent a 0.000004 percent increase in New Mexico CO_2 emissions.

4.2 Cultural Resources

4.2.1 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 APDs/ROWs, as the case may be.

Significant cultural sites (e.g. National Register eligible/listed) are being avoided with the implementation of design features such as but not limited to reduction of construction areas, temporary barriers, and site monitoring. These design features are detailed in the Cultural Resource Record of Review, attached to the COA in the APD/ROW as the case may be. The proposed action is not known to physically threaten any TCP's, prevent access to sacred sites, prevent the possession of sacred objects, or interfere or otherwise hinder the performance of traditional ceremonies/rituals. The proposed action will have no direct or indirect impact on significant cultural sites.

4.3 Soils

4.3.1 Direct and Indirect Effects

Due to the nature of drilling for oil and gas there would be soil disturbance within the action area. 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 would be especially susceptible to wind and water erosion until vegetation has been reestablished (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 established. Effects to soils would likely be low to moderate for the proposed project.

4.4 Water Resources

4.4.1 Direct and Indirect Effects

The proposed action would comply with water quality, quantity, and ground water protection standards under the Clean Water Act of 1977 and the Safe Drinking Water Act of 1974, as amended. The proposed project would create approximately 13.94 acres of new surface disturbances; 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 site construction and site stabilization.

Effects to ground water resources would be low due to mitigation measures such as casing, and any pits would be lined to meet NMOCD requirements. 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).

4.5 Vegetation

4.5.1 Direct and Indirect Effects

The proposed action would result in the loss of approximately 13.93 acres of sagebrush-dominant Great Basin Desert scrub. Following installation of the proposed well-tie pipelines and interim reclamation of unused portions of the well locations, approximately 12.13 acres would be recontoured and reseeded with the seed mixture chosen by the proponent and noted in the design features that were agreed upon during onsite inspections. There would be a long-term loss of approximately 1.8 acres of Great Basin Desert scrub within the action area. Soil disturbance provides opportunity for noxious or invasive weeds to become established. Conditions of approval will require control of noxious weeds.

4.6 Livestock Grazing

4.6.1 Direct and Indirect Effects

The Escrito E07-2409 and Escrito M07-2409 well pads, and associated access roads and pipelines are proposed to be constructed on the Blanco Trading Post, No.5081. The associated disturbance for construction of the well, access road and pipeline will be 13.94 acres. The 13.94 acres of disturbance would be in a Sagebrush Grassland Community The estimated short term impact to range carrying

capacity would be a loss of 0.79 aums (13.94ac/17.7ac/aum). After successful reclamation of the pipeline and construction areas, the long term loss of aums would be 0.01aums (1.8ac / 17.7ac/aum). Additional short term impacts may include displacement of permitted livestock during construction activities or exposure of livestock to hazards. After construction, livestock should become acclimated to the well and traffic associated with its maintenance. Vehicle traffic associated with this well could pose impacts to livestock considering that the area is open range and livestock may be found on roads in the area. Vehicle traffic will be significantly reduced after the wells are drilled and reclaimed. During the construction of the pipeline, livestock may fall into an open pipeline trench. Escape ramps will be installed at a minimum of every ¼ mile. The permittee will be contacted prior to construction activities.

4.7 Migratory Birds

4.7.1 Direct and Indirect Effects

The proposed action would result in the removal of approximately 13.94 acres of potential migratory bird habitat. Adult migratory birds would not be directly harmed by the proposed action because of their mobility and ability to avoid areas of human activity. No active nests within the action area are expected to be directly impacted since any drilling and construction activity would likely occur outside of the breeding season. However, if construction or drilling is scheduled to begin within the typical breeding season, a migratory bird nest survey would be conducted to minimize impacts to nesting birds. 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. Following the reclamation of approximately 12.13 acres of the affected environment, long term production operations would result in only a slight increase in human activity in the immediate 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 moderate short-term effects to migratory birds, and low long-term effects as a result of the action.

4.8 Special Management Species

4.8.1 Direct and Indirect Effects

The analysis area contains potential foraging habitat for golden eagle and ferruginous hawk. There would be a temporary loss of approximately 13.94 acres of potential foraging habitat prior to rehabilitation and reseeding. There would be a long term impact to approximately 1.80 acres of potential foraging habitat as a result of the proposed action. The analysis area does not contain suitable nesting habitat for the raptor species and is not within a 1/3 mile buffer zone to any historically documented raptor nest sites.

5.0 Cumulative Impacts

The proposed project is located within the San Juan Basin of northwestern New Mexico, which has been industrialized with oil and gas well development since the 1950's. The surface disturbance for each project that has been permitted throughout the Basin 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, well pads, and associated well-tie pipelines and larger distribution lines. 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. Preserving as much land as possible and applying appropriate mitigation measures will alleviate the cumulative impacts.

Potential impacts of continued development could include increased air borne soil particles blown from new surface disturbances, 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.

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.

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 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 San Juan Basin 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.

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 Supporting Information

6.1 Tribes, Individuals, Organizations, or Agencies Consulted

Jason Eckman – Encana Oil & Gas (USA) Inc.

Jason Edwards – NCE Surveys

Steve Fuller – La Plata Archaeological Consultants

Holly Hill – Encana Oil & Gas (USA) Inc.

Brenda Linster – Encana Oil & Gas (USA) Inc.

Johnny Stinson – Adobe Contractors

6.2 List of Preparers

Jillian Aragon – Bureau of Land Management – Farmington Field Office

Darlene Horsey – Bureau of Land Management – Farmington Field Office

Craig Willems – Bureau of Land Management – Farmington Field Office

Matthew Zabka, Environmental Specialist – Adkins Consulting, Inc.

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7.0 Appendices

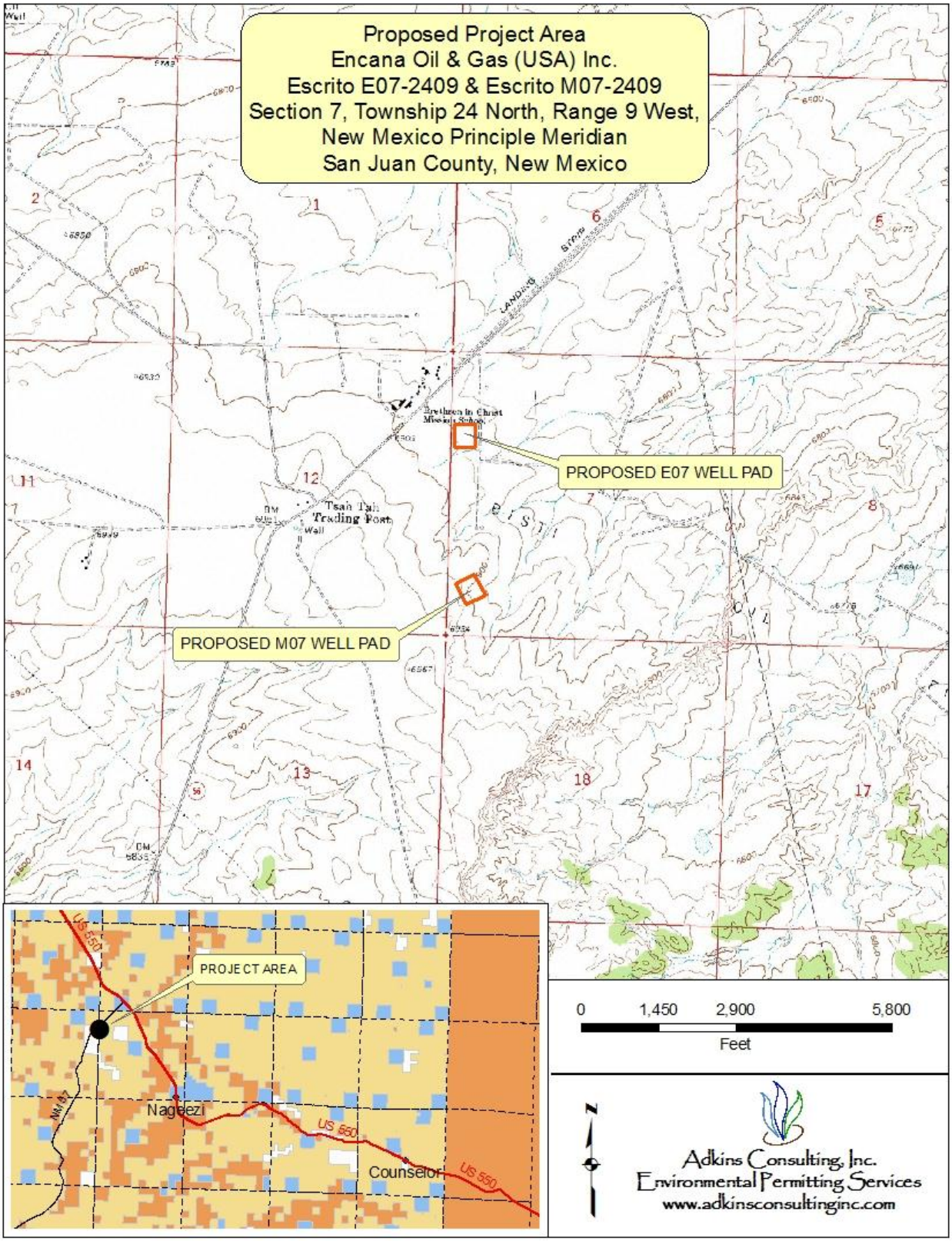
7.1 APD/COA

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

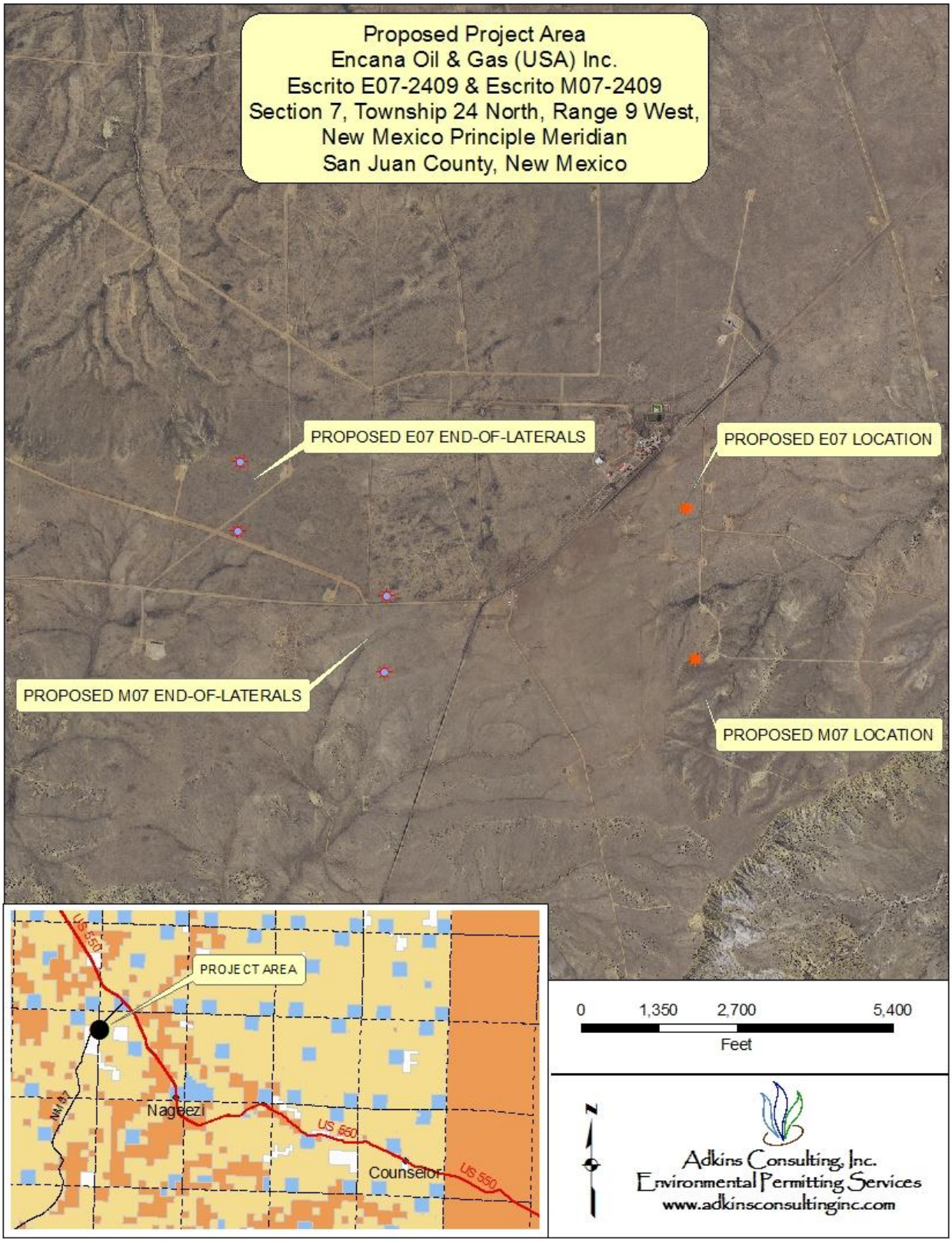
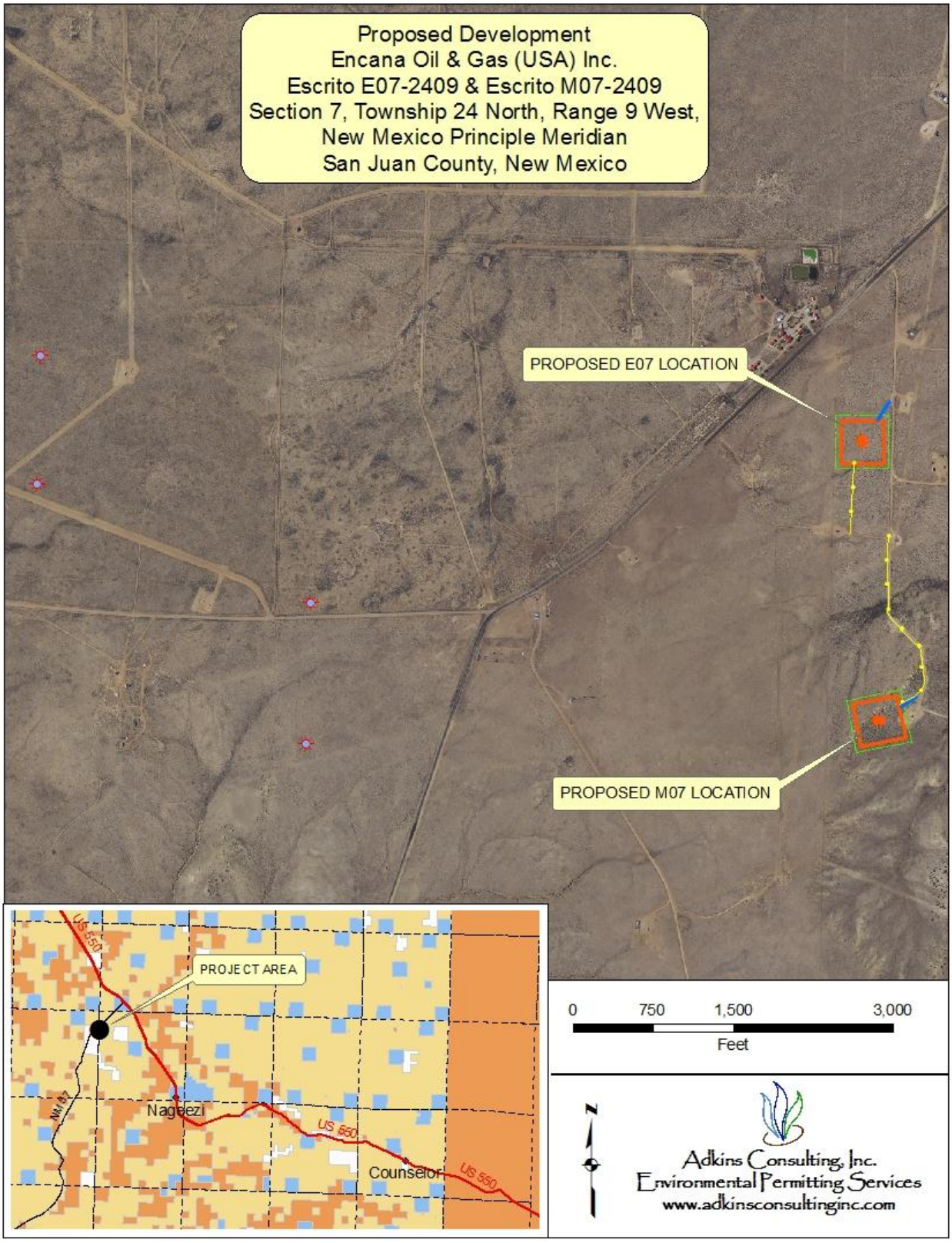
7.2 Authorities

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.
U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.

7.3 Maps (USGS Blanco Trading Post, NM 7.5-minute Topographic)



7.4 Maps (Digital Aerial Orthophoto)



7.5 Maps (Digital Aerial Orthophoto)