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Encana Oil & Gas (USA) Inc.'s Escrito D20-2409 No. 01H–04H, Escrito E22-2409 No. 01H–03H, Escrito M21-2409 No. 01H–02H, and Nageezi Unit 101H–103H Oil and Natural Gas Well Projects (Cluster 55)

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New Mexico • Farmington Field Office

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1. PURPOSE AND NEED FOR THE ACTION

1.1. Background

Encana Oil & Gas (USA) Inc. (Encana) has submitted 12 Applications for Permit to Drill (APDs) and 11 Standard Form 299 right-of-way (ROW) grant applications to the Bureau of Land Management (BLM) Farmington Field Office (FFO) for the oil and natural gas well projects (Proposed Action) listed below. The BLM FFO is the lead agency for the Proposed Action because it manages the surface estates associated with the proposed projects. The Bureau of Indian Affairs (BIA) Federal Indian Minerals Office (FIMO) is the cooperating agency.

- Escrito D20-2409 No. 01H–04H (Escrito D20) (four total wells on one well pad)
- Escrito E22-2409 No. 01H–03H (Escrito E22) (three total wells on one well pad)
- Escrito M21-2409 No. 01H–02H (Escrito M21) (two total wells on one well pad)
- Nageezi Unit 101H–103H (Nageezi 101H–103H) (three total wells on one well pad)

The proposed projects would involve the horizontal drilling, possible production, and final abandonment of 12 oil and natural gas wells. Each well would access federally and/or Indian Allotted minerals permitted under an approved APD issued by the BLM FFO with the concurrence of BIA FIMO. The mineral lease number and mineral ownership for each well is provided in Table 1. Encana's objective would be to safely and efficiently gather oil, natural gas, and produced water from the leases outlined in Table 1.

Table 1. Mineral Lease Number and Ownership for Project Wells

Project Name	Well Numbers	Mineral Lease Number	Mineral Ownership
Escrito D20	01H–02H	NO-G-0103-1462	Indian Allotted
		NM4958	Federal
	03H–04H	NM10755	
Escrito E22	01H–03H	NM 36474	
Escrito M21	01H–02H	NMNM10755	
Nageezi 101H–103H	101H–103H	NM12374	

The surface features associated with each project would consist of a well pad (including construction zone), access road, and well-connect pipeline. Additionally, Escrito D20 and Escrito M21 would each have one temporary use area (TUA), and Nageezi 101H–103H would have one staging area. If a surface feature associated with a project is located on-lease or within Encana's Nageezi well unitization area, the feature would be permitted under an APD. If a surface feature associated with a project is located off-lease and/or outside of Encana's Nageezi well unitization area, the feature would be permitted under a ROW grant. The surface features associated with each project and the permit type associated with each surface feature are provided in Table 2. It is anticipated that if the APDs and ROW grants are approved, construction of the proposed projects would commence in 2016.

Table 2. Proposed Project Surface Features and Permit Type(s)

Surface Feature	Length (feet)	Dimensions (feet)	Permit Type
Escrito D20			
Access road	6,078	-	4 ROW grants
Well pad and construction zone	-	500 × 590	
Well-connect pipeline	5,740	-	
TUA	-	100 × 200	
Escrito E22			
Access road	822	-	3 ROW grants
Well pad and construction zone	-	500 × 560	
Well-connect pipeline	892	-	

Surface Feature	Length (feet)	Dimensions (feet)	Permit Type
Escrito M21			
Access road	7,088	-	4 ROW grants
Well pad and construction zone	-	530 × 500	
Well-connect pipeline	6,381	-	
TUA	-	Irregular shape	
Nageezi 101H–103H			
Access road	496	-	APD
Well pad and construction zone	-	500 × 560	
Well-connect pipeline	523	-	
Staging area	-	150 × 200	

The proposed project areas are located on surface managed by the BLM FFO in the San Juan Basin of northwestern New Mexico (Figure 1). Specifically, the proposed projects are situated in San Juan County and are located approximately 30 miles south-southeast of the town of Bloomfield and 3 to 5 miles northwest of the community of Nageezi.

SWCA Environmental Consultants (SWCA) conducted biological surveys of the proposed project areas and prepared a Biological Survey Report (BSR). Photographs were taken of the proposed project areas. Additionally, La Plata Archaeological Consultants (LAC) prepared cultural resources inventories for the proposed projects, which are on file with the BLM FFO.

This Environmental Assessment (EA) complies with the requirements of the National Environmental Policy Act of 1969 (NEPA) and federal regulations found in 40 Code of Federal Regulations (CFR) Chapter V. The BLM is including these four projects in one EA because the projects are in the same general area and share similar characteristics. The project record contains an interdisciplinary analysis to support the findings in this document and is located at the BLM FFO. This EA analyzes the site-specific impacts associated with the Proposed Action and its alternatives, identifies mitigation measures to potentially reduce or eliminate those impacts, and provides agency decision-makers with detailed information upon which to approve or deny the Proposed Action or an alternative.

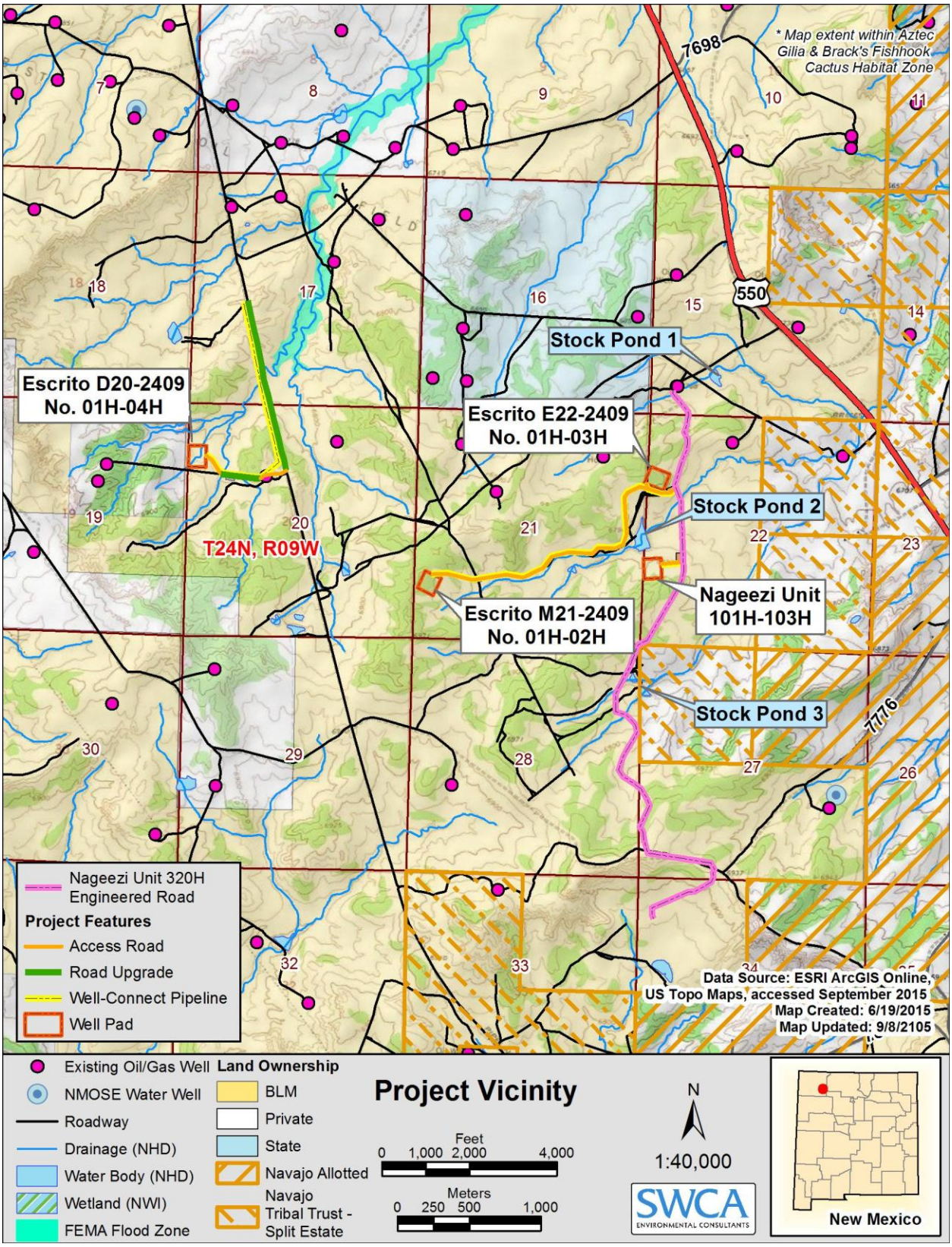

Figure 1. General location map.

1.2. Purpose and Need for Action

The purposes for the Proposed Action are as follows:

- The BLM's purpose is to allow Encana to have access to BLM-managed lands for the exploration and development of the fluid mineral leases outlined in Table 1 while protecting the surface resources to the maximum extent possible.
- The FIMO's purpose is to allow Encana to have access to Indian Allotted mineral leases for the exploration and production of fluid minerals outlined in Table 1.

The BLM's need for the Proposed Action is established by its responsibility under the Mineral Leasing Act of 1920 (MLA), as amended (30 United States Code [USC] 181 et seq.), the Federal Land Policy and Management Act of 1976 (FLPMA) (43 USC 1701 et seq.), and the Federal Onshore Oil and Gas Leasing Reform Act of 1987 (43 CFR 3160). The MLA authorizes the BLM to lease public lands for the development of mineral deposits (including oil, gas, and other hydrocarbons) and to permit the development of those leases. The FLPMA authorizes the BLM to grant, issue, or renew ROW grants over public lands for multiple uses. It is the policy of the BLM, as derived from several laws, including the MLA and FLPMA, to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs. Per the Federal Onshore Oil and Gas Leasing Reform Act, the BLM is required to respond to a request for an APD or ROW grant.

The FIMO's need for the Proposed Action is established by the BIA's responsibilities under the Leasing of Allotted Lands for Mineral Development (25 CFR 212), which allows for the development of individual Indian oil and gas resources. Per this regulation, the BLM is required to respond to a request for an APD after receiving the FIMO's recommendations.

1.3. Decision to be Made

Based on the information in this EA, the BLM FFO will decide whether or not to issue the APD and/or ROW grant, and if so, under what terms and conditions. Under the NEPA (Public Law [PL] 91-90, 42 USC 4321 et seq.), the BLM-FFO must determine if there are any significant environmental impacts associated with the proposed action warranting further analysis in an Environmental Impact Statement (EIS). The BLM FFO Field Manager is the responsible officer who will decide either:

- To approve the APDs and/or ROW grants with design features as submitted;
- To approve the APDs and/or ROW grants with additional mitigations;
- To analyze the effects of the proposal in an EIS; or
- To deny the APDs and/or ROW grants.

1.4. Conformance with Applicable Land Use Plan(s)

The Proposed Action is in conformance with the BLM FFO's September 2003 Resource Management Plan (RMP) with Record of Decision (ROD), as updated in December 2003 (BLM 2003a). Oil and gas exploration and development are recognized as an appropriate use of public lands by the BLM FFO's 2003 RMP (BLM 2003a), which provides management direction for the leased areas. The BLM will consider approval of the proposed APDs and ROW grants in a manner that avoids or reduces impacts to other resources, is consistent with the lease rights granted to the applicant, and prevents unnecessary or undue degradation of public lands. The BLM FFO completed the RMP by signing the ROD on September 29, 2003 (BLM 2003a). The RMP provides for the integrated multiple use and sustained yield of resources for the planning area.

The Proposed Action is in conformance with the goals and objectives of the 2003 BLM FFO RMP, which states the following:

- “It is the policy of the BLM to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs, consistent with national objectives of an adequate supply of minerals at reasonable market prices. At the same time, the BLM strives to ensure that mineral development is carried out in a manner that minimizes environmental damage and provides for the rehabilitation of affected lands.” (BLM 2003a:2-2–2-3).
- “…dual completion, re-completion and commingling (both downhole and at the surface) will be encouraged and permitted in order to reduce the number of new well pads and consequent surface disturbance. This in turn, will reduce impacts to soils and vegetation, reduce air impacts caused by fugitive dust, reduce habitat fragmentation and offer less opportunity for the spread of noxious weeds” (BLM 2003a:4).

This EA addresses the resources and impacts on a site-specific basis as required by NEPA. Pursuant to 40 CFR 1508.28 and 1502.21, this site-specific EA tiers to the information and analysis contained in the BLM FFO’s *Proposed Resource Management Plan and Final Environmental Impact Statement* (*PRMP/FEIS*) (BLM 2003b). In particular, the cumulative impact analysis contained in the *PRMP/FEIS*, coupled with the level of development proposed by the Reasonably Foreseeable Development (RFD) scenario developed for the 2003 RMP, accounts for the broader impacts of oil and gas development (Engler et al. 2001). Tiering to a NEPA document that contains broader impact analysis allows the BLM to consider a more defined range of alternatives for the Proposed Action. Scoping conducted during the development of the RMP is also brought forward, as it allows the BLM to focus on the site-specific issues or concerns of the Proposed Action.

1.5. Relationship to Statutes, Regulations, or Other Plans

Encana would comply with all applicable federal, state, and local laws and regulations. Necessary permits and approvals for the proposed projects would be obtained prior to project implementation. Many requirements regulating specific environmental elements are found in the appropriate element sections of this EA (Chapter 3). Several permits, licenses, consultations, or other requirements are discussed below.

1.5.1. Council on Environmental Quality Regulations

Parts 1500 through 1508 of the Council on Environmental Quality (CEQ) regulations (40 CFR 1500.3) provide stipulations applicable to and binding for all federal agencies for implementing the procedural provisions of NEPA, “except where compliance would be inconsistent with other statutory requirements.”

Additionally, Encana 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, permits for the installation of water management facilities, water discharge permits, and relevant air quality permits; and
- implement the Proposed Action in a way that is as consistent as possible with local, county, or state plans.

1.5.2. New Mexico Administrative Code 19.15

The New Mexico Oil Conservation Division (NMOCD) regulates oil and gas operations in New Mexico. These regulations that were not in effect for consideration during the 2003 RMP process must also now be included in the analysis of oil and natural gas development projects. The NMOCD has the responsibility of gathering production data, permitting new wells, establishing pool rules and allowables, issuing discharge permits, enforcing rules and regulations, monitoring underground injection wells, ensuring that abandoned wells are properly plugged, and ensuring that the land is responsibly restored. Oil and gas regulations administered by the NMOCD include the following:

- New Mexico Administrative Code (NMAC) 19.15.15: This regulation establishes well acreage spacing, obtaining approval of unorthodox well locations, and pooling or communitizing small acreage oil lots.
- NMAC 19.15.16: This regulation requires the disclosure of hydraulic fracture constituents.

- NMAC 19.15.17: The “Pit Rule” reduces groundwater contamination from industry-related activities by regulating permits, construction, operation, and subsequent closure of temporary pits within NMOCD District 3.

The Proposed Action analyzed in this EA would be consistent with NMAC 19.15.

1.5.3. Endangered Species Act of 1973

The Endangered Species Act of 1973 (ESA) 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 would 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 *PRMP/FEIS* (Consultation No. 2-22-01-I-389) to address cumulative effects of RMP implementation (BLM 2003b). The consultation is summarized in Appendix M of the *PRMP/FEIS* (BLM 2003b). BLM FFO staff reviewed the action alternative and determined it would be in compliance with threatened and endangered species management guidelines outlined in the September 2002 Biological Assessment (Consultation No. 2-22-01-I-389). No further consultation with the USFWS is required.

1.5.4. Clean Air Act

The Clean Air Act of 1970, as amended (42 USC 7401 et seq.), establishes National Ambient Air Quality Standards (NAAQS) to control air pollution. The New Mexico Environment Department (NMED) Air Quality Bureau oversees air quality regulations and standards for stationary sources of air pollution. Impacts to air quality from oil and gas exploration and development are controlled by mitigation measures developed on a case-by-case basis. As part of the planning and decision-making process, the BLM must consider and analyze the potential effects of its activities on air resources. This EA discusses the contributions of the Proposed Action to regulated air pollutants and greenhouse gas (GHG) emissions and includes general discussion of potential impacts. Additional general information on air quality in the area is contained in Chapter 3 of the *PRMP/FEIS* (BLM 2003b).

1.5.5. National Historic Preservation Act

Heritage resources are protected by the National Historic Preservation Act of 1966 (NHPA) ([PL 89-665), as amended, and its implementing regulations (36 CFR 800) and other legislation, including NEPA (PL 91-852) and its implementing regulations (40 CFR 1500–1508). Other relevant laws include the following:

- Antiquities Act of 1906 (PL 52-209),
- Archaeological and Historical Conservation Act of 1974 (PL 93-291),
- Archaeological Resources Protection Act of 1979 (ARPA) (PL 96-95) and its regulations (36 CFR 296),
- American Indian Religious Freedom Act (42 USC 1996),
- Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (PL 101-601), and
- Executive Order (EO) 11593 of 1971.

BLM FFO compliance with Section 106 is adhered to by following the State Protocol Agreement between New Mexico BLM and New Mexico State Historic Preservation Officer (SHPO) (BLM-SHPO 2014), which is authorized by the National Programmatic Agreement (NPA) among the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers (NPA 2012), and other applicable BLM handbooks.

1.5.6. Clean Water Act

The Proposed Action is in conformance with Sections 401, 402, and 404 of the Clean Water Act of 1972 (CWA), as amended (33 USC 1251 et seq.).

- Section 401: An applicant for a federal license or permit to conduct an activity that may result in a discharge into a water of the U.S. must provide the federal agency with a Section 401 certification declaring that the discharge would comply with the CWA. The certification would be granted by the NMED.
- Section 402: The U.S. Environmental Protection Agency (EPA) regulates storm water discharges from industrial and construction activities under the National Pollutant Discharge Elimination System program. Permits are required if discharge results in a reportable quantity for which notification is required or if the discharge contributes to a violation of water quality standards. Due to Section 323 of the Energy Policy Action of 2005 and the 1987 Water Quality Act, the proposed projects are exempt from Section 402 of the CWA because the storm water generated from the proposed projects would be uncontaminated and result from a "field activity or operation associated with exploration, production, processing, or treatment operations, or transmission facilities" (33 USC 1362[24]).
- Section 404: The EPA regulates the discharge of dredged and fill material into waters of the U.S., including wetlands. The Section 404 program is administered by the EPA and the U.S. Army Corps of Engineers (USACE). Under the CWA, the USACE has jurisdiction over waters of the U.S. Waters of the U.S. have a "significant nexus" to traditional navigable waters. The BLM FFO and USACE have determined that waters of the U.S. within the BLM FFO planning area may include U.S. Geological Survey (USGS) watercourses (i.e., blue lines on USGS 1:24,000 topographic maps) and potentially tributaries to these USGS watercourses.

1.5.7. Executive Order 12898

Executive Order 12898 of 1994, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires federal agencies to ensure that proposed projects under their jurisdictions do not cause a disproportionate environmental impact that would affect any group of people because of a lack of political or economic strength. Environmental justice requires "the fair treatment of people of all races, cultures, incomes, and educational levels with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (EPA 2008).

1.6. Scoping, Public Involvement, and Issues

1.6.1. Scoping and Public Involvement

Appropriate scoping helps identify resources and resource uses that could be impacted, reducing the chances of overlooking a potentially significant issue or reasonable alternative. The pre-disturbance on-site meetings, which were attended by Encana, BLM FFO representatives, SWCA, and LAC were held for the proposed projects. The pre-disturbance on-site meetings dates are as follows:

- March 31, 2015: Escrito E22 and Nageezi 101H–103H
- April 1, 2015: Escrito D20 and Escrito M21

Prior to the pre-disturbance on-site meetings, the BLM FFO invited the Huerfano Chapter House of the Navajo Nation. In addition, the lease holder for livestock grazing within the proposed project areas was invited to the pre-disturbance on-site meetings. A public invitation was emailed to the chapter house, private citizens/groups, and grazing allottee(s). No representatives from the chapter house, private citizens/groups, or the grazing allottee attended the meetings.

The BLM FFO's Interdisciplinary Team of resource specialists discussed the Proposed Action on April 6, 2015. The issues determined appropriate for analysis are listed below. In addition, the BLM FFO publishes a NEPA log for public inspection. This log contains a list of proposed and approved actions on BLM FFO lands. The log is located on the BLM New Mexico website (http://www.blm.gov/nm/st/en/prog/planning/nepa_logs.html). Because extensive external scoping was completed during the *PRMP/FEIS* (BLM 2003b) process, additional external scoping has not been conducted for this Proposed Action. No public comments were received for the Proposed Action.

1.6.2. Issues to be Analyzed

The following relevant issues or concerns were discussed and subsequently brought forward for detailed analysis in this EA:

- Air Resources: How would construction and production activities associated with the Proposed Action impact air resources?
- Soil Resources: How would surface disturbance associated with the Proposed Action impact soils and erosion?
- Surface Water Resources: Would surface disturbance and downhill drilling impact surface water quality?
- Upland Vegetation: How would surface disturbance associated with the Proposed Action impact vegetation?
- Noxious Weeds and Invasive Species: How would the Proposed Action impact the establishment and distribution of invasive or non-native species?
- Wildlife: How would the Proposed Action impact wildlife, including migratory birds?
- Special Status Species: How would the Proposed Action impact the following BLM special status species: Aztec gilia (*Aliciella formosa*), Brack's fishhook cactus (*Sclerocactus cloverae* var. *brackii*), Bendire's thrasher (*Toxostoma bendirei*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), loggerhead shrike (*Lanius ludovicianus*), and pinyon jay (*Gymnorhinus cyanocephalus*)?
- Cultural Resources: How would surface-disturbing activities associated with the Proposed Action affect cultural resources?
- Livestock Grazing: Grazing is an important economic activity in northwestern New Mexico, how does this Proposed Action affect grazing in the vicinity of the proposed project areas?
- Social and Economic Features/Environmental Justice: Oil and gas industry activities create employment opportunities; how does this Proposed Action contribute to the economy? Would any low-income or minority populations be disproportionately impacted by the Proposed Action?
- Public Health and Safety: How would the Proposed Action impact public health and safety?

1.6.3. Issues Considered but Not Analyzed

Several resources commonly analyzed under the NEPA either do not occur within the vicinity of the proposed project areas or would otherwise not experience impacts from the Proposed Action and therefore have not been brought forward for detailed analysis. The following issues were considered but not analyzed in detail in this EA.

Groundwater

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

Hydraulic fracturing is a common process in the San Juan Basin and applied to nearly all wells drilled. The producing zone targeted by the Proposed Action is well below any underground sources of drinking water. The Mancos Shale formation is also overlain by a continuous confining layer. The geological

confining layer is the Lewis Shale formation that is located above both the Mancos Shale and Mesaverde formations and provides an impermeable layer that isolates the Mancos Shale and Mesaverde formations from both identified sources of drinking water and surface water. On average, total depth of the proposed well bore would be about 5,000 feet below the ground surface. Fracturing in the Basin Mancos formation is not expected to occur above depths of 4,000 feet below the ground surface. Fracturing could possibly extend into the Mesaverde formation overlying the Basin Mancos; however, the formation has not been identified as an underground source of drinking water based on its depth and relative high levels of total dissolved solids. No impacts to surface water or freshwater-bearing groundwater aquifers are expected to occur from hydraulic fracturing of the proposed wells.

USFWS-Listed Species

Under Section 7 of the ESA, as amended, the BLM is required to consult with the USFWS on any Proposed Action that may affect federally listed threatened or endangered species or species proposed for listing. SWCA conducted biological surveys of the proposed project areas in April and May 2015. The exact dates of survey by proposed project site are outlined below.

- Escrito D20: May 1 and 7
- Escrito E22: April 2
- Escrito M21: April 30
- Nageezi 101H–103H: April 2 and 14

No USFWS-listed threatened or endangered species or their habitats were found in the proposed project areas during the biological surveys (a list of federally listed species and species that are candidate or proposed for listing with potential to occur in San Juan County, New Mexico, and their potential to occur in the proposed project areas is included in the BSR).

Water for drilling and completing the proposed wells would be obtained from the existing Blanco Trading Post water well (New Mexico Office of State Engineer No. SJ-2105). Approximately 1.2 million gallons of water would be utilized to drill and complete each well.

BLM FFO staff have reviewed the Proposed Action and determined it would be in compliance with threatened and endangered species management guidelines outlined in the September 2002 Biological Assessment (Consultation No. 2-22-01-I-389) conducted for the *PRMP/FEIS* (BLM 2003b). No further consultation with the USFWS is required.

Native American Religious Concerns

For the Proposed Action, identification efforts were limited to reviewing existing published and unpublished literature (e.g., Van Valkenburgh 1941, 1974; Brugge 1993; Kelly et al. 2006), the site-specific Class III survey reports prepared for the Proposed Action (LAC Report 2014-2fff [Escrito D20; LAC 2015a], LAC Report 2014-2gg [Escrito E22; LAC 2015b], LAC Report 2014-2dd [Escrito M21; LAC 2015c], and LAC Report 2014-2hh [Nageezi 101H–103H; LAC 2015d]), and a review by the BLM's cultural resources program regarding the presence of Traditional Cultural Properties (TCPs) identified through ongoing BLM tribal consultation efforts. There are currently no known remains that fall within the purview of NAGPRA (25 USC 3001) or ARPA (16 USC 470) within the proposed project areas. The Proposed Action would not impact any known TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere with or hinder the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act of 1978 (42 USC 1996) or EO 13007.

Visual Resources

The BLM manages visual resources by assigning a Visual Resource Management class, which is based on the scenic quality and visual resource inventory for the subject area, among other visual resource considerations such as potential users or sensitive viewers. The subject project is located within a Visual Resource Management Class IV management area, which is the least restrictive class on potential development.

There are no residences in proximity to or visible from the proposed project areas. No other sensitive viewers have been identified for this action. As a result, visual resources are not being analyzed for possible impacts in this EA.

Areas of Critical Environmental Concern

Section 202 of FLPMA requires the BLM to give priority to designation and protection of any Area of Critical Environmental Concern (ACEC) during the land use planning process. An ACEC is an area within public lands where special management attention is required to protect and prevent irreparable damage to important resources or other natural systems or processes and protect life and safety from natural hazards. ACECs differ from other special management designations, such as wilderness areas, in that the ACEC designation, by itself, does not automatically prohibit other uses in the area. The proposed project areas are not within any ACECs. The nearest ACEC is the Betonnie Tsosie, which is approximately 4 miles south-southwest of the proposed project areas. Because this ACEC is beyond the visual and auditory vicinity of the proposed project areas, ACECs are therefore not analyzed for possible impacts in this EA.

2. PROPOSED ACTION AND ALTERNATIVE(S)

2.1. Alternative A: No Action

BLM NEPA Handbook H-1790-1 states that for EAs on externally initiated proposed actions, the No Action alternative generally means that the proposed activity would not be approved (BLM 2008a:52). This option is provided in 43 CFR 3162.3-1(h)(2). Under this alternative, the BLM would deny the approval of the proposed APDs and ROW grants. If the APDs and ROW grants are not approved, Encana would retain the lease rights, oil and natural gas would not be extracted from the proposed wells, and production in the area would continue at its current rate. If also not approved, the associated surface disturbance (i.e., construction of the proposed well pads, access roads, well-connect pipelines, TUAs, and staging area) would not occur, and current uses in the area would continue to occur. The No Action alternative is presented for baseline analysis of resource impacts in Chapter 3 (Affected Environment and Environmental Consequences).

2.2. Alternative B: Proposed Action

As outlined in Section 1.1 (see Table 1 and Table 2), the Proposed Action is the BLM FFO approval of 12 APDs and issuance of 11 ROW grants associated with Encana's proposed Escrito D20, Escrito E22, Escrito M21, and Nageezi 101H–103H projects. The Proposed Action also includes concurrence from FIMO for the two proposed wells (Escrito D20-2409 No. 01H–02H) that also access Navajo Allotted minerals.

The proposed projects would include the drilling, production, and final abandonment of 12 oil and natural gas wells. The primary objective of the proposed wells would be to produce oil; however, it is likely that natural gas would be a byproduct. Each proposed project would consist of the construction, use, and reclamation of an associated well pad (including construction zone), access road, and well-connect pipeline. Additionally, the proposed Escrito D20 and Escrito M21 projects would each include the construction, use and reclamation of one TUA. The proposed Nageezi 101H–103H project would consist of the construction, use, and reclamation of one staging area.

It is anticipated that if the APDs and ROW grants are approved, construction of the proposed projects would commence in 2016. The scheduled commencement of the proposed projects could be delayed based on the issuance date of the approved APDs and ROW grants or Encana's drill rig schedule. The lifetime of each proposed project is anticipated to be up to 40 years.

2.2.1. Location of Proposed Project Areas

The proposed project areas are located within the BLM FFO management area on surface managed by the BLM FFO in the San Juan Basin of northwestern New Mexico. Specifically, the proposed projects are located in San Juan County, within or immediately south-southeast of the Bisti Oil Field area, approximately 30 miles south-southeast of the town of Bloomfield, and 3 to 5 miles northwest of the community of Nageezi. The proposed projects can be found on the Blanco Trading Post, New Mexico USGS 7.5-minute quadrangle (see Figure 1). The proposed projects are located within Township 24 North, Range 9 West (New Mexico Prime Meridian [NMPM]). The section(s), quarter-quarter(s), and land ownership for each proposed project area are provided in Table 3. The latitude, longitude, and footages of the bottom hole and surface hole (wellhead) locations are provided on the plats.

Table 3. Legal Land Descriptions and Surface Ownership

Project Features	Legal Location within Township 24 North, Range 9 West (NMPM)		Land Ownership
	Quarter-Quarter	Section	
Escrito D20			
Access road and well-connect pipeline	All of NW ¼	20	BLM FFO
	E ½ of SW ¼ NW ¼ of SW ¼	17	
Well pad and construction zone	W ½ of NW ¼	20	
TUA	SW ¼ of NW ¼		
Escrito E22			
Access road and well-connect pipeline	SW¼ of NW¼	22	BLM FFO
Well pad and construction zone	W ½ of NW ¼		
	SE ¼ of NE ¼	21	
Escrito M21			
Access road and well-connect pipeline	SW ¼ of NW ¼	22	BLM FFO
	SE ¼ of NE ¼ N ½ of SE ¼ N ½ of SW ¼	21	
Well pad and construction zone	W ½ of SW ¼		
TUA	SW ¼ of NW ¼	22	
Nageezi 101H–103H			
Access road, well-connect pipeline, and staging area	NW ¼ of SW ¼	22	BLM FFO
Well pad and construction zone	NE ¼ of SE ¼	21	
	NW ¼ of SW ¼	22	

Topography in the proposed project areas ranges from hilly to rolling hills with intermixed shallow valleys. The slopes in the proposed project areas are gentle to moderate, with the elevation in the proposed project areas ranging from 6,770 to 6,970 feet above mean sea level (amsl). The elevation range for each proposed project area is described in Table 4.

Table 4. Project-Specific Elevations

Project Name	Elevation (feet amsl)
Escrito D20	6,780–6,860
Escrito E22	6,770–6,810
Escrito M21	6,770–6,970
Nageezi 101H–103H	6,780–6,850

Existing oil and gas lease roads, well pads, and utility corridors are in the general vicinity of the proposed project areas. Maps with aerial photographs of the proposed project areas are provided below (Figure 2 and Figure 3).

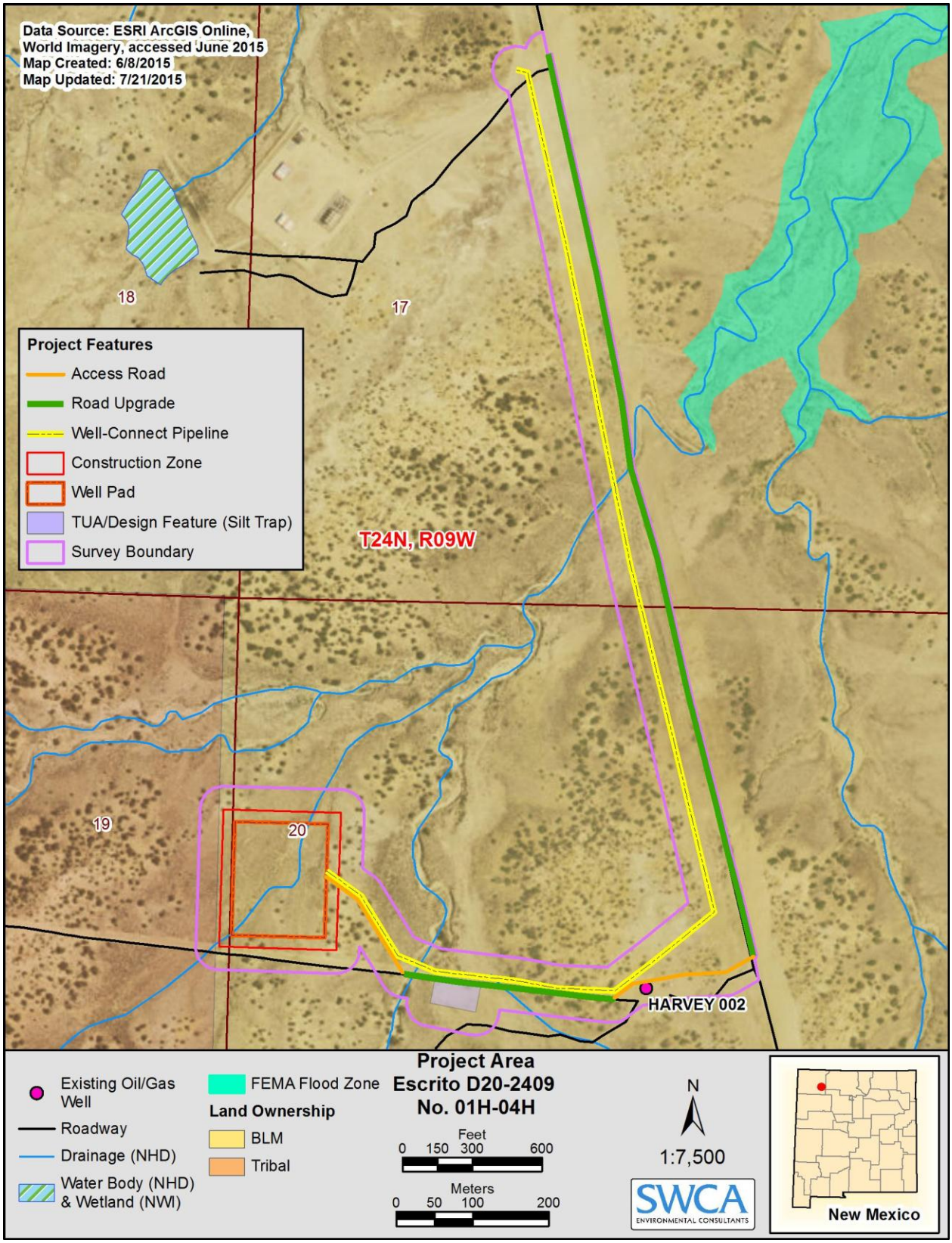

Figure 2. Escrito D20 project aerial photograph map.

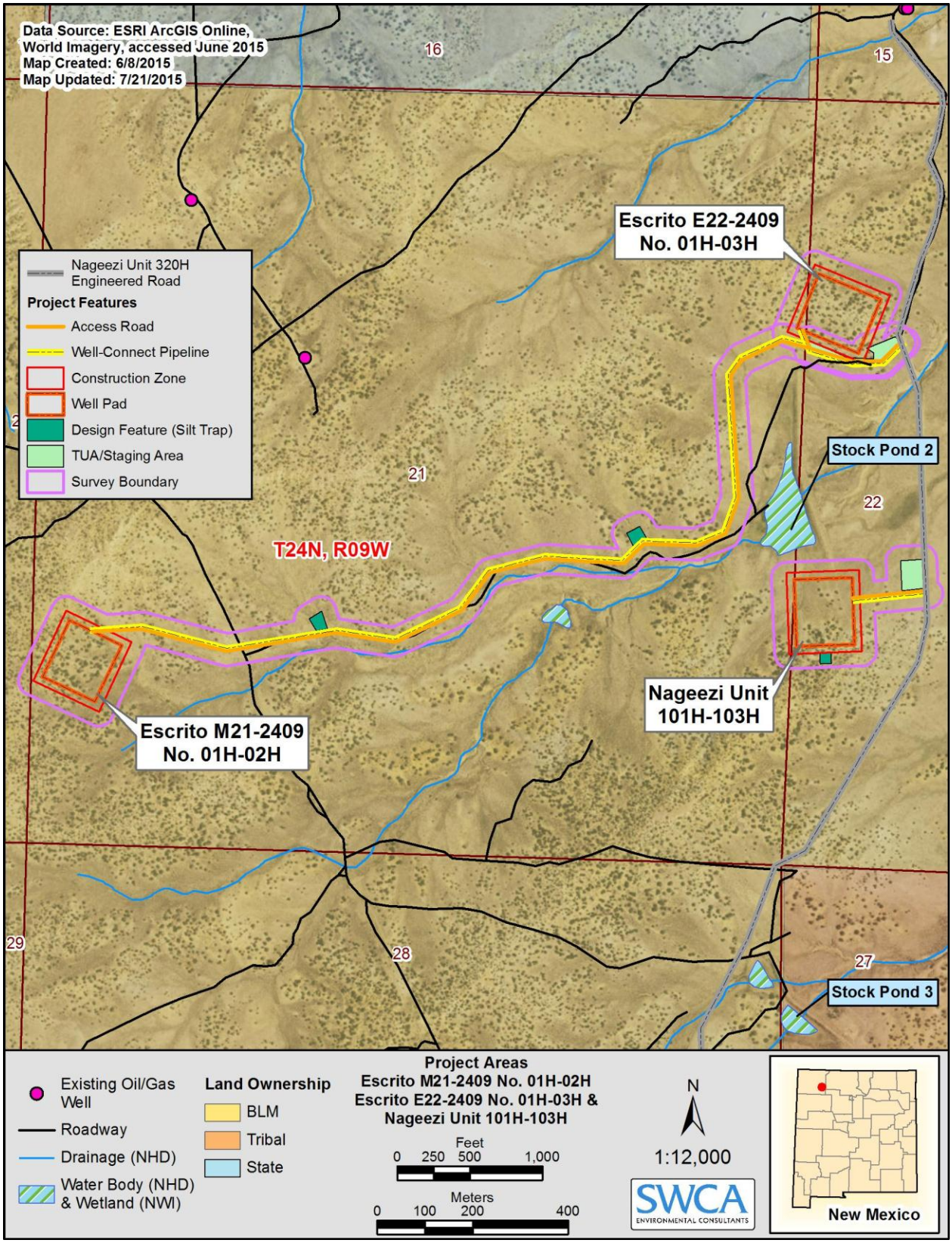

Figure 3. Escrito E22, Escrito M21, and Nageezi 101H–103H project aerial photograph map.

2.2.2. Proposed Surface Disturbance

The proposed projects would result in 40.9 acres of new surface disturbance. Of this, 5.2 acres would be reseeded (but not recontoured) and 24.0 acres would be fully reclaimed (reseeded and recontoured) during interim reclamation. The remaining 11.7 acres would remain disturbed throughout the life of the proposed projects. In addition, 0.6 acre of an existing two-track road associated with the proposed Escrito M21 project would be reclaimed (reseeded and recontoured) during interim reclamation. This disturbance is summarized in Table 5. Individual proposed project disturbances are summarized in the subsections below.

Table 5. Surface Disturbance Associated with Proposed Projects

Project Feature	Surface Disturbance (acres)		Interim Reclamation		Final Reclamation
	Total	New	Reseeded and Recontoured	Reseeded Only	
Escrito D20					
Access road	2.6	0.9	0.0	0.4	0.5
Well pad and construction zone	6.8	6.8	4.4	0.0	2.4
Well-connect pipeline	5.3	2.9	2.9	0.0	0.0
TUA	0.5	0.5	0.0	0.2	0.3
Total	**15.2**	**11.1**	**7.3**	**0.6**	**3.2**
Escrito E22					
Access road	0.6	0.1	0.0	<0.1	0.1
Well pad and construction zone	6.4	6.3	4.2	0.0	2.1
Well-connect pipeline	0.8	0.4	0.4	0.0	0.0
Total	**7.8**	**6.8**	**4.6**	**<0.1**	**2.2**
Escrito M21					
Access road	13.0	5.9	0.0	3.3	2.6
Well pad and construction zone	6.1	6.1	4.7	0.0	1.4
Well-connect pipeline	5.9	2.9	2.9	0.0	0.0
TUA	0.7	0.4	0.0	0.4	0.0
Total	**25.7**	**15.3**	**7.6**	**3.7**	**4.0**
Nageezi 101H–103H					
Access road	0.3	0.3	0.0	0.1	0.2
Well pad and construction zone	6.5	6.5	4.3	0.1	2.1
Well-connect pipeline	0.5	0.2	0.2	0.0	0.0
Staging area	0.7	0.7	0.0	0.7	0.0
Total	**8.0**	**7.7**	**4.5**	**0.9**	**2.3**
Total	***56.7***	***40.9***	***24.0***	***5.2***	***11.7***

Escrito D20

The proposed project would result in 11.1 acres of new surface disturbance. Of this, 0.6 acre would be reseeded (but not recontoured) and 7.3 acres would be fully reclaimed (reseeded and recontoured) during interim reclamation. The remaining 3.2 acres would remain disturbed throughout the life of the proposed project and would be reclaimed when the wells are abandoned.

Access Road

The access road corridor would be 6,078 feet long. Of this 6,078 feet, 4,903 feet would involve upgrading an existing road (hereafter referred to as *upgraded access road*) and 1,175 feet would consist of a newly constructed access road (hereafter referred to as *new access road*).

The 4,903-foot-long upgraded access road, which would start at Encana's existing Escrito L17-2409 access road, is approximately 15 feet wide (1.7 acres). Because the upgraded access road overlaps existing, maintained roads, the upgraded access road is not being considered new surface disturbance.

One pullout (0.1 acre) would be utilized along the upgraded access road. The pullout would be 250 × 20 feet and would be considered new surface disturbance. The pullout would be located from station (STA) 52+49.54 to STA 54+99.54. Approximately 250 × 10 feet of the pullout (0.1 acre) would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation. The pullout slopes (less than 0.1 acre) would be reseeded during interim reclamation but not recontoured.

One additional pullout would be constructed along the upgraded access road from STA 51+98.04 to STA 53+97.97. This pullout would be placed within the project TUA after the project wells have been completed. The surface disturbance associated with this pullout is described in the TUA section below.

The 1,175-foot-long new access road would be 30 feet wide (0.8 acre). The 14-foot-wide running surface of the new access road and the bottoms of the bar ditches alongside the road (0.4 acre) would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation. The remaining 0.4 acre associated with the new access road would be reseeded during interim reclamation but not recontoured.

Well Pad and Construction Zone

The well pad would measure 490 × 400 feet (4.5 acres). A 50-foot-wide (2.3-acre) construction zone would surround the well pad. The working area, which would measure 300 × 350 feet (2.4 acres), would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation. The remaining 4.4 acres of the well pad and construction zone would be reseeded and recontoured during interim reclamation.

Well-Connect Pipeline

The well-connect pipeline corridor would be 5,740 feet long and 40 feet wide (5.3 acres). Portions of this corridor would overlap previously existing disturbance and disturbance associated with other portions of the project, as described below. Therefore, new surface disturbance associated with the well-connect pipeline corridor would be 2.9 acres. All of this disturbance would be reseeded and recontoured during interim reclamation.

- Approximately 5,192 feet of the well-connect pipeline corridor length would travel parallel and adjacent to the upgraded and new access roads. Where the well-connect pipeline corridor would parallel an access road, approximately 20 feet of the corridor would overlap the access road. There would be 2.4 acres of new surface disturbance associated with these portions of the well-connect pipeline corridor.
- Approximately 548 feet of the well-connect pipeline corridor length would travel cross-country. There would be 0.5 acre of new surface disturbance associated with this portion of the well-connect pipeline corridor.

TUA

One 0.5-acre TUA would be used for the project. The TUA would be located along the southern side of the upgraded access road from STA 51+98.04 to STA 53+97.97. After the project wells have been completed, 0.3 acre of the TUA would be converted into an access road pullout (as described in the access road section above), and a 50-foot-wide × 200-foot-long (0.2-acre) design feature (silt trap) would be constructed on the southern side of the pullout. The design feature (silt trap) would be reseeded during

interim reclamation but not recontoured. The remaining 0.3 acre would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation.

Escrito E22

The proposed project would result in 6.8 acres of new surface disturbance. Of this, less than 0.1 acre would be reseeded (but not recontoured) and 4.6 acres would be fully reclaimed (reseeded and recontoured) during interim reclamation. The remaining 2.2 acres would remain disturbed throughout the life of the project and would be reclaimed when the wells are abandoned. The TUA associated with the Escrito M21 project would also be used for the Escrito E22 project.

Access Road

The access road corridor would be 822 feet long and 30 feet wide (0.6 acre). Approximately 690 feet of the access road corridor (STA 0+00.00–6+90.00) would overlap the Escrito M21 access road. Therefore, new surface disturbance associated with the access road corridor would be 0.1 acre. The 14-foot-wide running surface of the access road and the bottoms of the bar ditches alongside the road (0.1 acre) would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation. The remaining acreage (less than 0.1 acre) associated with the access road would be reseeded during interim reclamation but not recontoured.

Well Pad and Construction Zone

The well pad would measure 460 × 400 feet (4.2 acres). A 50-foot-wide (2.2-acre) construction zone would surround the well pad. Corner 5 of the well pad construction zone (less than 0.1 acre) would be rounded to avoid the need for a large amount of fill within this portion of the project. In addition, approximately 0.1 acre of the well pad would overlap the access road and Escrito M21 TUA. Therefore, new surface disturbance associated with the well pad and construction zone would be 6.3 acres.

The working area, which would measure 300 × 300 feet (2.1 acres), would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation. The remaining 4.2 acres of the well pad and construction zone would be reseeded and recontoured during interim reclamation.

Well-Connect Pipeline

The well-connect pipeline corridor would be 892 feet long and 40 feet wide (0.8 acre). The well-connect pipeline corridor would travel parallel and adjacent to the access road; therefore, 20 feet of the corridor would overlap the access road. New surface disturbance associated with the well-connect pipeline corridor would be 0.4 acre. All of this disturbance would be reseeded and recontoured during interim reclamation.

Escrito M21

The proposed project would result in 15.3 acres of new surface disturbance. Of this, 3.7 acres would be reseeded (but not recontoured) and 7.6 acres would be fully reclaimed (reseeded and recontoured) during interim reclamation. The remaining 4.0 acres would remain disturbed throughout the life of the project and would be reclaimed when the wells are abandoned. In addition, 0.6 acre of an existing two-track road would be reclaimed (reseeded but not recontoured) during interim reclamation.

Access Road

New surface disturbance for the access road totals 5.9 acres. This includes the access road itself, pullouts, and design features (silt traps).

- The access road corridor would be 7,088 feet long and 30 feet wide (4.9 acres). Portions of the access road would overlap an existing two-track road; however, the existing two-track road is not a maintained road. Therefore, the entire access road is considered new surface disturbance.
- Seven pullouts (0.5 acre, total) would be used along the access road for sight safety mitigation and to allow traffic in an area to pass. Each pullout would be 150 × 20 feet. The pullout locations

by STA number are as follows: 7+25.00–8+75.00, 17+25.00–18+75.00, 24+79.00–26+29.00, 33+50.00–35+00.00, 43+00.00–44+50.00, 52+25.00–53+75.00, and 63+10.00–64+60.00.

- Two design features (silt traps) would be constructed along the access road. These features would total 0.5 acre. The dimensions and locations are provided below.
  - 100 × 100 × 104 × 93 feet: STA 29+95.99–30+73.08
  - 101 × 100 × 76 × 130 feet: STA 54+36.53–55+14.02

The 14-foot-wide running surface of the access road, the bottoms of the bar ditches alongside the road, and 150 × 10 feet of each pullout (2.6 acres, total) would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation. The remaining 3.3 acres located along the pullout slopes, within the design features (silt traps), and outside of the 14-foot-wide running surface and bar ditches of the access road would be reseeded during interim reclamation but not recontoured.

A 2,770-foot-long and 10-foot-wide (0.6-acre) portion of an existing two-track road could not be paralleled by the project access road due to an existing stock pond and erosional issues associated with a watercourse located adjacent to and paralleling this portion of the two-track road. The 2,770-foot-long portion of the existing two-track road located directly south and southeast of the project access road (approximate STA 8+80.00 to STA 36+50.00) would be closed, disked, and reseeded during interim reclamation.

Three existing stock ponds (6.5 acres, total [acreage estimated from aerial photography]) would be cleaned out as part of the project. The soil from the cleaned out stock ponds would be used as construction material for the project access road. The BLM FFO has granted permission to Encana for cleaning out these stock ponds. These stock ponds are existing features; therefore, the stock ponds are not considered new surface disturbance.

Well Pad and Construction Zone

The well pad would measure 430 × 400 feet (4.0 acres). A 50-foot-wide (2.1-acre) construction zone would surround the well pad. The working area, which would measure 250 × 250 feet (1.4 acres), would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation. The remaining 4.7 acres of the well pad and construction zone would be reseeded and recontoured during interim reclamation.

Well-Connect Pipeline

The well-connect pipeline corridor would be 6,381 feet long and 40 feet wide (5.9 acres). The well-connect pipeline corridor would travel parallel and adjacent to the access road; therefore, 20 feet of the corridor would overlap the access road. New surface disturbance associated with the well-connect pipeline corridor would be 2.9 acres. All of this disturbance would be reseeded and recontoured during interim reclamation.

TUA

One TUA would be used for the project. Surface disturbance associated with this area would consist of vegetation removal but would not consist of topsoil removal. The TUA would be approximately 0.7 acre and would be located along the northern side of the access road from STA 0+00.00 to STA 6+90.00. Of the 0.7 acre, 0.3 acre would overlap the project access road. Therefore, new surface disturbance associated with the TUA would be 0.4 acre. All of this disturbance would be reseeded during interim reclamation. No recontouring would be needed, as topsoil removal would not take place within the TUA.

Nageezi 101H–103H

The proposed project would result in 7.7 acres of new surface disturbance. Of this, 0.9 acre would be reseeded (but not recontoured) and 4.5 acres would be fully reclaimed (reseeded and recontoured) during interim reclamation. The remaining 2.3 acres would remain disturbed throughout the life of the project and would be reclaimed when the wells are abandoned.

Access Road

The access road corridor would be 496 feet long and 30 feet wide (0.3 acre). The 14-foot-wide running surface of the access road and the bottoms of the bar ditches alongside the road (0.2 acre) would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation. The remaining 0.1 acre associated with the access road would be reseeded during interim reclamation but not recontoured.

Well Pad and Construction Zone

The well pad would measure 460 × 400 feet (4.2 acres). A 50-foot-wide (2.2-acre) construction zone would surround the well pad. The working area, which would measure 300 × 300 feet (2.1 acres), would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation. The remaining 4.3 acres of the well pad and construction zone would be reseeded and recontoured during interim reclamation.

One 75 × 75–foot (0.1-acre) design feature (silt trap) would be constructed along the south-central side of the well pad construction zone (between corners 5 and 6). This design feature (silt trap) would be reseeded during interim reclamation but not recontoured.

Well-Connect Pipeline

The well-connect pipeline corridor would be 523 feet long and 40 feet wide (0.5 acre). The well-connect pipeline corridor would travel parallel and adjacent to the access road; therefore, 20 feet of the corridor would overlap the access road. New surface disturbance associated with the well-connect pipeline corridor would be 0.2 acre. All of this disturbance would be reseeded and recontoured during interim reclamation.

Staging Area

One approximately 150 × 200–foot (0.7-acre) staging area would be used for the project. The staging area would be located directly north of the project access road and west of Encana's Nageezi Unit 320H (Nageezi 320H) engineered access road upgrade project. The Nageezi 320H road was previously approved by the BLM FFO (NEPA ID number DO1-BLM-NM-F010-2013-0105).

Surface disturbance associated with this area would consist of vegetation removal but not topsoil removal. All of this disturbance would be reseeded during interim reclamation. No recontouring would be needed, as topsoil removal would not take place within the staging area.

2.2.3. Proposed Project Design Features and Best Management Practices

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

The Proposed Action includes applicant-committed environmental protection measures, also known as design features that mitigate or lessen impacts to resources. These measures are summarized below. For a detailed description of design features associated with the proposed projects, refer to the APDs and ROW grant applications on file at the BLM FFO.

Air Resources

Best management practices (BMPs) for reducing air emissions from field production and operations would include the following:

- Maintain vapor recovery systems in areas where petroleum liquids are stored,
- Ensure that compressor engines 300 horsepower or less have nitrogen oxide (NO_X) emissions limited to 2 grams per horsepower hour,
- Revegetate areas not required for production facilities, and
- Water dirt roads during periods of high use.

Air quality impacts associated with construction projects primarily arise from fugitive dust generation by construction vehicles and equipment. Reasonable precautions would be used to prevent fugitive dust from becoming airborne. Magnesium chloride, organic-based compounds, polymer compounds, or water could be applied to roads or other surfaces to reduce fugitive dust. Petroleum-based products and produced water would not be used to control dust. The BLM's standard BMPs provided in *The Gold Book: Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (*The Gold Book*) (BLM and U.S. Forest Service [USFS] 2007) and the BLM's COAs/stipulations attached to the APDs and ROW grants would also be used for controlling fugitive dust.

Soils

The top 6 inches of topsoil would be stripped from the surface of the proposed projects during the construction phase of the projects. The topsoil would be free of brush and tree limbs, trunks, and root balls. The topsoil would be stored separately from subsoil or other excavated material. Topsoil would not be used for padding the proposed well-connect pipelines. Gaps would be made in soil stockpiles (where necessary) to avoid ponding or to divert water during storm events. Vehicle and equipment traffic would not be allowed to cross topsoil stockpile(s).

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

Construction and maintenance activities would cease when soil or road surfaces become saturated to the extent that construction equipment is unable to stay within the proposed project areas and/or when activities would cause irreparable harm to roads or soils. If equipment creates ruts deeper than 6 inches, the soil would be deemed too wet for construction or maintenance. No frozen soils would be used for construction purposes or trench backfilling.

Water

Encana would follow NMOCD Pit Rule guidelines and Onshore Order No. 1 (issued under Onshore Oil and Gas Operations [40 CFR 3160]). A closed-loop system would be used for the proposed projects.

Hydrostatic test water from the proposed projects would be hauled off-site to a permitted disposal facility. Additionally, construction and maintenance activities would cease when activities could cause irreparable harm to watercourses.

Along the proposed well-connect pipeline corridors, water bars could be constructed (if specified by the BLM FFO). If water bars are required, they would follow the horizontal contour of the hill slope on which they are placed. The spacing requirements by hill slope grade are provided Table 6.

Table 6. Water Bar Spacing Requirements by Percent Grade of Hill Slope

Hill Slope Percent Grade	Water Bar Spacing (feet)
Less than 1%	400
1%–5%	300
5%–15%	200
15%–25%	100

Escrito D20

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

During the pre-disturbance on-site meeting, erosion control measures were; these measures are listed below.

- A portion of the TUA located along the southern side of the upgraded access road from STA 51+98.04 to 53+97.97 would be converted into a 50 × 200–foot design feature (silt trap) upon interim reclamation. An overflow channel would be directed into the bar ditch associated with the southern edge of the upgraded access road. From the bar ditch, the overflow water would flow into the existing wash located approximately 140 feet west of the TUA/design feature (silt trap). The TUA/design feature (silt trap) is described in Section 2.2.2 (Proposed Surface Disturbance).
- A silt trap would be placed within the well pad construction zone near the southwestern corner of the well pad (corner 3).
- Storm water would be diverted around corner 3 of the well pad to the northwestern corner of the well pad (corner 5). From corner 5, water would be diverted northward into the sagebrush shrubland vegetation community.
- Storm water would be diverted around the southeastern corner of the well pad (corner 2) to the northeastern corner of the well pad (corner 6). From corner 6, water would be diverted northward into the sagebrush shrubland vegetation community.
- Four 24-inch-diameter culverts would be placed beneath the proposed access road at STA 40+53.41, 41+75.29, 55+32.50, and 60+77.50.
- Six 24-inch diameter culverts would be placed beneath the upgraded access road at STA 0+00.00, 2+66.97, 6+86.18, 18+12.95, 22+17.66, and 48+13.09.
- One 36-inch-diameter culvert would be placed beneath the upgraded access road at STA 35+25.73.

Escrito E22

During the pre-disturbance on-site meeting, erosion control measures were identified; these measures are listed below.

- Storm water would be diverted from the western side (working side) of the well pad around the northwestern corner of the well pad (corner 3).
- Storm water would be diverted from the western side (working side) of the well pad around the southwestern corner of the well pad (corner 2), beneath the access road via a 24-inch-diameter culvert, to the Escrito M21 TUA.
- Six 24-inch-diameter culverts would be placed beneath the access road at STA 0+00.00, 1+65.00, 3+45.00, 4+85.00, 5+83.00, and 8+22.00.

Escrito M21

The proposed access road was shifted northward to avoid inadvertent impacts to a watercourse and stock pond. A 2,770-foot-long portion of an existing two-track located directly south and southeast of the proposed project access road (approximate STA 8+80.00 to 36+50.00) and adjacent to the watercourse and stock pond would be closed, disked, and reseeded during interim reclamation.

During the pre-disturbance on-site meeting, erosion control measures were identified; these measures are listed below.

- Storm water would be diverted around the well pad from the western corner (corner 3) to the northern corner (corner 5).
- Storm water would be diverted around the well pad from the western corner (corner 3) to the southern corner (corner 2).
- Two design features (silt traps) would be constructed along the northern side (high-side) of the access road/well-connect pipeline corridor. These design features (silt traps) are described in Section 2.2.2 (Proposed Surface Disturbance).
- Culverts would be placed beneath the access road at the following locations: STA 0+00.00, 1+65.00, 3+45.00, 6+90.00, 9+62.00, 12+20.00, 13+85.00, 16+34.00, 18+95.00, 19+85.00, 21+72.00, 23+08.00, 24+30.00, 25+50.00, 37+00.00, 39+45.00, 42+50.00, 44+50.00, 49+65.00, 53+83.00, 54+43.00, 57+80.00, 60+42.00, 62+85.00, 66+36.00, and 70+88.00.

Nageezi 101H–103H

During the pre-disturbance on-site meeting, erosion control measures were identified; these measures are listed below.

- A 75 × 75–foot design feature (silt trap) would be placed south of the well pad construction zone near the southern-central side of the well pad (between corners 5 and 6). This design feature (silt trap) is described in Section 2.2.2 (Proposed Surface Disturbance).
- Storm water would be diverted from the southeastern corner (corner 5) of the well pad to the design feature (silt trap).
- Storm water would be diverted from the design feature (silt trap) around the southwestern corner (corner 6) of the well pad to the northwestern corner (corner 2) of the well pad.
- Storm water would be diverted from corner 5 of the well pad to the northeastern corner (corner 3) of the well pad.
- From corners 2 and 3, storm water would be diverted northward into an existing stock pond.
- One 24-inch-diameter culvert would be placed beneath the access road at STA 2+64.89.

Escrito M21 and Nageezi 101H–103H

Three existing stock ponds, all located on BLM FFO-managed surface, would be cleaned out (see Figure 1).

Wildlife

General Wildlife

Wildlife hazards associated with the proposed projects would be fenced, covered, and/or contained in storage tanks, as necessary.

As stated above (Water), Encana would follow NMOCD Pit Rule guidelines and Onshore Order No. 1.

For each proposed well-connect pipeline, gaps would be made in topsoil and subsoil stockpiles, where necessary, to allow for wildlife crossings. If present, established wildlife trails would be left in place as crossovers across the well-connect pipe trenches. Escape ramps or crossovers would be constructed every 1,320 feet within the trenches. The escape ramps/crossovers would be constructed with a minimum 3 to 1 (horizontal to vertical) slope at each end. The escape ramps/crossovers would be a minimum of 10 to 12 feet wide and would not be fenced.

No more than the amount of well-connect pipe trench that can be worked on in 1 day would be open at any given time. Trenches would not be left open for more than 24 hours. If a trench is left open overnight, Encana would provide a night guard to monitor the open trench and ensure that no wildlife becomes entrapped. The ends of the proposed well-connect pipe trenches would be sloped (3 to 1) each night to allow wildlife to escape.

The ends of the well-connect pipes would be plugged to prevent animals from crawling inside of them. Before a well-connect pipe trench is closed, it would be inspected for wildlife. Any trapped wildlife would be promptly removed and released at least 450 feet from the trench.

Migratory Birds

Per BLM Instruction Memorandum No. 2013-033, if any pits or tanks are associated with the proposed projects, they would be netted to prevent birds from entering them.

Because the proposed projects would each disturb more than 4 acres of vegetation, if construction activities associated with any of the proposed projects would occur during the migratory bird breeding season (May 15–July 31), a pre-construction nesting survey of the proposed project areas would take place up to 1 week prior to vegetation removal within each project area. The survey(s) would be conducted by a BLM FFO-approved biologist following BLM FFO protocol. If active nests are located during the survey, avoidance buffers (as determined by the BLM FFO) would be established around

occupied nests, or construction would not begin until the birds have fledged or until the nest has been otherwise mitigated (as determined by the USFWS). If postponement is not an option, Encana would contact the USFWS's Migratory Bird Permit Office regarding permitting.

Pre-construction nesting surveys would also establish the occupancy status of potentially suitable nesting burrows detected within the project areas for burrowing owls (*Athene cunicularia*). If any active burrowing owl burrows are identified, a 150-meter avoidance radius would be established around the active nest site.

Should any active raptor nests be observed within 0.3 mile of the proposed project areas prior to or during project implementation, construction would cease and the BLM FFO would be immediately contacted. The BLM FFO would then ensure evaluation of the resource.

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

Upland Vegetation

During reclamation activities, the *Farmington Field Office Bare Soil Reclamation Procedures* (BLM 2013a) would be used for the proposed projects. These procedures were referenced during the preparation of Encana's surface reclamations plans.

Reclamation standards are based on eight BLM FFO–designated vegetation communities that are outlined in the *Farmington Field Office Bare Soil Reclamation Procedures* (BLM 2013a). Of these eight vegetation communities, it was determined during the pre-disturbance on-site meeting that the communities listed below best represent the proposed project areas:

- Escrito D20: sagebrush community
- Escrito E22: piñon-juniper community
- Escrito M21: piñon-juniper community for the well pad (including construction zone) and sagebrush community for the access road and well-connect pipeline corridors
- Nageezi 101H–103H: piñon-juniper community

During the pre-disturbance on-site meeting, plant species where chosen from the BLM FFO's seed pick lists for the vegetation communities listed above. The plant species picked for reclamation are provided in the surface reclamation plans.

Noxious Weeds and Invasive Species

It would be Encana's responsibility to monitor, control, and eradicate noxious weeds within the proposed project areas throughout the life of the proposed projects. Encana would contact the BLM FFO regarding acceptable weed-control methods.

One New Mexico Department of Agriculture (NMDA) Class B-listed species (Russian knapweed [*Acroptilon repens*]) was identified within two of the existing stock ponds to be used for the proposed Escrito M21 and Nageezi 101H–103H projects. In order to control/eradicate noxious weeds within these two existing stock ponds and potential noxious weeds in the third existing stock pond, the three stock ponds have been incorporated into Encana's weed maintenance program.

One NMDA-listed Class B noxious weed (halogeton [*Halogeton glomeratus*]) was observed in the course of the biological surveys for the proposed project. Halogeton was identified at the northern terminus of the proposed well-connect pipeline corridor for the Escrito D20. In order to control/eradicate noxious weeds the affected area will be incorporated into Encana's weed maintenance program.

If Encana does not hold a current Pesticide Use Proposal, a Pesticide Use Proposal would be submitted prior to pesticide application. Only pesticides authorized for use on BLM lands would be used. The use of pesticides would comply with federal and State of New Mexico laws. Pesticides would be used only in accordance with their registered use and limitation. Encana would contact the BLM FFO prior to using these chemicals.

Special Status Species

The proposed project areas are within the BLM FFO's designated habitat "zone" for two BLM special status species: Brack's fishhook cactus and Aztec gilia (BLM 2013b). As described in the BSR, during SWCA's biological surveys, no Aztec gilia were identified within the proposed project areas, no Brack's fishhook cacti were identified within the proposed Escrito E22 and Nageezi 101H–103H survey areas, and 122 Brack's fishhook cacti were identified within the proposed Escrito D20 and Escrito M21 survey areas. Of these 122 cacti, 25 total cacti were identified within the proposed project surface disturbance areas (22 within the proposed Escrito D20 surface disturbance area and 3 within the proposed Escrito M21 surface disturbance area). These cacti are depicted on the figures in the BSR. Due to 25 cacti being located within the proposed surface disturbance areas and the potential effects of fugitive dust on adjacent cacti, relocating and transplanting of Brack's fishhook cacti would be required for the Proposed Action. Additionally, operators would be responsible for monitoring the transplanted cacti for 3 years. The BLM FFO will provide Encana with guidance on the number of cacti to be transplanted and monitoring requirements prior to construction.

Should any additional special status species be observed within the proposed project areas prior to or during project implementation, construction would cease and the BLM FFO would be immediately contacted. The BLM FFO would then evaluate the resource. Should a discovery be evaluated as significant (protected under the ESA, etc.), it would be protected in place until mitigation could be developed and implemented according to guidelines set by the BLM FFO.

Encana would notify the BLM and USFWS upon discovery of a dead or injured special status species within or adjacent to the proposed project areas. If the BLM becomes aware of such mortality or injury, the BLM would inform Encana. If Encana fails to notify the USFWS of the mortality or injury, the BLM would notify the USFWS. The BLM and the USFWS would then attempt to determine the cause of mortality and identify appropriate mitigation measures to avoid future occurrences.

Per BLM FFO Instruction Memorandum No. NM-200-2008-001 (BLM 2008b), an updated pre-construction biological survey could be required for any of the four proposed projects if vegetation removal would occur after one year of the previous biological survey.

Cultural Resources

All BLM FFO cultural resources stipulations would be followed as indicated in the Cultural Resource Records of Review attached to the COAs in the APDs and stipulations in the ROW grants. The cultural resource stipulations could include, but are not limited to the following:

- 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 subcontractors of the proposed projects would be informed by Encana that cultural sites are to be avoided by all personnel, personal vehicles, and company equipment; 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 ARPA (16 USC 470aa–mm). In the event of a discovery during construction, the proposed project proponent would immediately stop all construction activities in the immediate vicinity of the discovery and immediately notify the archaeological monitor, if present, or the BLM. The BLM would then evaluate or cause the site to be evaluated. Should a discovery

be evaluated as significant (e.g., National Register of Historic Places [NRHP], NAGPRA, ARPA), it would be protected in place until mitigating measures could be developed and implemented according to guidelines set by the BLM.

Paleontological Resources

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

Visual Resources

Equipment that would not be subject to safety requirements would be painted Juniper Green to blend with the surrounding landscape.

Livestock Grazing

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

As stated above (Water), three existing stock ponds, all located on BLM FFO–managed surface, would be cleaned out as part of the proposed Escrito M21 and Nageezi 101H–103H projects. These stock ponds are depicted on Figure 1.

For each proposed well-connect pipeline, gaps would be made in topsoil and subsoil stockpiles, where necessary, to allow for cattle crossings.

If present, established livestock trails would be left in place as crossovers across the well-connect pipe trenches. Escape ramps or crossovers would be constructed every 1,320 feet within the trenches. If active livestock grazing is occurring in the proposed project areas, these ramps/crossovers would be constructed every 500 feet. The escape ramp/crossovers would be constructed with a minimum 3 to 1 slope at each end. The escape ramps/crossovers would be a minimum of 10 to 12 feet wide and would not be fenced.

No more than the amount of well-connect pipe trench that can be worked on in 1 day would be open at any given time. Trenches would not be left open for more than 24 hours. If a trench is left open overnight, Encana would provide a night guard to monitor the open trench and ensure that no livestock becomes entrapped. The ends of the proposed well-connect pipe trenches would be sloped (3 to 1) each night to allow livestock to escape.

Before a well-connect pipe trench is closed, it would be inspected for livestock. Any trapped livestock would be promptly removed and released at least 450 feet from the trench.

Public Health and Safety

The hauling of equipment and materials on public roads would comply with New Mexico Department of Transportation regulations. Any accidents involving persons or property would be reported to the BLM FFO. Encana would notify the public of potential hazards by posting signage, having flaggers, or using lighted signs, as necessary.

Worker safety incidents would be reported to the BLM FFO as required under Notice to Lessees (NTL)–3A (USGS 1979). Encana would adhere to company safety policies, Occupational Safety and Health Administration (OSHA) regulations, and pipeline safety regulations (per 40 CFR 190 and 192). The proposed well-connect pipe trenches would be excavated and sloped in accordance with OSHA specifications.

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

Approximately 630 feet of new access road (STA 39+87.57 to STA 46+17.82) associated with the proposed Escrito D20 project would be rerouted around the northern side of Dugan Production Corporation's (Dugan's) active Harvey No. 2 well pad in order to avoid potential health and safety concerns that could arise by having vehicles travel through the center of the active well pad.

Control of Waste

Liquid and solid wastes would be disposed of at an appropriate waste disposal site. In the event of a spill or release, the proper reporting and cleanup procedures would be followed. Encana would notify the BLM within 24 hours of spills. The proposed project areas would be maintained in a sanitary condition. Hazardous substances would be handled and disposed of according to federal law. Waste resulting from construction activities would be removed from the proposed project areas and disposed of in an authorized area. No trash would be buried or burned on location.

During the proposed project phases described below, self-contained chemical toilets would be provided on-site for human waste disposal. The toilet holding tanks would be pumped, as needed, and the contents would be disposed of at an approved sewage disposal facility.

As stated above (Wildlife), Encana would follow NMOCD Pit Rule guidelines and Onshore Order No. 1.

Noise

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

Additional Design Features and BMPs

Vehicles would be restricted to proposed disturbance areas and existing areas of disturbance.

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

The proposed projects are located within the outer boundary of the Huerfano Chapter of the Navajo Nation. The chapter house contact on file with the BLM FFO would be notified prior to construction.

2.2.4. Proposed Project Phases

For a detailed description of construction practices associated with the proposed projects, refer to the APDs and ROW grant applications on file at the BLM FFO. The Proposed Action would consist of seven phases: 1) upgrade of existing roads; 2) construction of well pads, access roads, TUAs, and staging area; 3) drilling and completion; 4) construction of well-connect pipelines; 5) interim reclamation; 6) production and operation; and 7) final reclamation and abandonment. These phases are described below. Refer to the section above (Proposed Project Design Features and Best Management Practices) for resource-protection details associated with the proposed project phases.

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

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

Upgrade of Existing Roads

Existing roads would be maintained in the same or better condition as existed prior to the commencement of the operation phase of the proposed projects. This maintenance would continue until final abandonment and reclamation of the proposed project areas. Encana would inspect and maintain the existing roads as outlined in their road maintenance plans attached to their APDs and ROW grant applications on file with the BLM FFO.

Escrito D20

As described in Section 2.2.2 (Proposed Surface Disturbance), 4,903 feet of the proposed access road would involve updating an existing resource road. The 4,903-foot-long upgraded access road would start at Encana's existing Escrito L17-2409 access road (ROW grant serial number NMNM 130632). The road would be upgraded to standards established by *The Gold Book* (BLM and USFS 2007) and BLM Manual 9113, Sections 1 and 2 (BLM 2011a, 2011b).

One pullout would be used along the upgraded access road from STA 52+49.54 to STA 54+99.54. Following drilling and completion of the proposed Escrito D20 wells, the proposed TUA located from STA 51+98.04 to STA 53+97.97 would be converted into a pullout along the upgraded access road.

Escrito E22, Escrito M21, and Nageezi 101H–103H

No road upgrades would be associated with these three proposed projects, as the proposed access roads associated with these projects would start at Encana's existing Nageezi 320H road.

Construction of Well Pads, Access Roads, TUAs, and Staging Area

Proposed well pad and access road construction would take 2 to 4 weeks at each proposed project site, and each proposed TUA/staging area would take less than 1 week. During construction of the proposed well pads, access roads, TUAs, and staging area, the following equipment could be used on-site: chainsaw, brush hog, scraper, maintainer, excavator, and dozer.

The proposed well pads and access roads would be cleared of vegetation and leveled. The proposed TUAs and staging area would be cleared of vegetation but would not be leveled. Vegetation and topsoil removal would take place as described in the surface reclamation plans.

Well Pads

The size of the proposed well pads are slightly larger than typical well pads in the BLM FFO management area because the equipment associated with the hydraulic fracturing design requires a larger area. The well pad dimensions (including the 50-foot-wide construction zone around the perimeter of the well pad) and the maximum cut and fill for each proposed well pad are provided in Table 7.

Table 7. Proposed Well Pad Dimensions, Maximum Cut, and Maximum Fill

Well Pad Dimensions (feet)	Maximum Well Pad Cut		Maximum Well Pad Fill	
	Feet	Location	Feet	Location
Escrito D20				
590 × 500	14.4	Corner 2	12.8	Corner 6
Escrito E22				
560 × 500	19.3	Working side (Between corners 2 and 3)	19.8*	Corner 5*
Escrito M21				
530 × 500	18.9	Corner 3	13.5	Corner 6
Nageezi 101H–103H				
560 × 500	19.8	Corner 5	15.5	Corner 3

*Corner 5 of the proposed well pad construction zone would be rounded to avoid the need for a large amount of fill within this portion of the project.

The proposed well pads would be constructed from the native borrow soil and subsoil accumulated during construction activities. The excavated material from well pad cuts would be used on the fill portions of the proposed well pads in order to create a level surface. If additional fill or surfacing material would be needed, Encana would obtain the material from an existing permitted or private source and haul the material by truck using existing roads.

Access Roads

The access road lengths and maximum estimated road grades for the proposed access roads are provided in Table 8.

Table 8. Proposed Access Road Lengths and Maximum Estimated Road Grades

Proposed Project	Length (feet)	Maximum Estimated Road Grade (%)
Escrito D20	6,078 [1]	3
Escrito E22	822 [2]	5
Escrito M21	7,088	3
Nageezi 101H–103H	496	3

[1] Of this 6,078 feet, 4,903 feet would involve the upgraded access road and 1,175 feet would consist of the new access road.
[2] Approximately 690 feet of the access road corridor (STA 0+00.00–6+90.00) would overlap the Escrito M21 access road.

A 30-foot-wide workspace would be associated with each proposed access road, which would include a 14-foot-wide running surface with adequate crowning. The proposed access roads would be designed and constructed as resource roads in accordance with *The Gold Book* (BLM and USFS 2007) and BLM Manual 9113, Sections 1 and 2 (BLM 2011a, 2011b). If the proposed wells are commercially viable, Encana would upgrade the proposed access roads, as necessary, to accommodate year-round traffic and meet all-weather standards. The proposed access roads would be maintained for the life of the proposed projects in accordance with *The Gold Book* (BLM and USFS 2007) and Encana's road maintenance plans attached to its APDs and ROW grant application on file with the BLM FFO.

The proposed access roads would be constructed from the native borrow soil and subsoil accumulated during construction activities. Three existing stock ponds (see Figure 1) would be cleaned out as part of the proposed Escrito M21 and Nageezi 101H–103H projects. The soil from the cleaned out stock ponds would be used as construction material for these two proposed access roads. If additional fill or surfacing material would be needed for the four proposed access roads, Encana would obtain the material from an existing permitted or private source and would haul the material by truck using existing roads.

TUAs

As described in Section 2.2.2 (Proposed Surface Disturbance), two TUAs would be associated with the proposed projects, specifically one TUA for the Escrito D20 project and one TUA for the Escrito E22 and Escrito M21 projects. The Escrito D20 TUA would be located along the southern side of the upgraded access road from STA 51+98.04 to STA 53+97.97. After the proposed Escrito D20 wells have been completed, this TUA would be converted into an access road pullout and design feature (silt trap). The Escrito E22 and Escrito M21 TUA would be located along the northern side of the proposed Escrito M21 access road from STA 0+00.00 to STA 6+90.00.

Staging Area

As described in Section 2.2.2 (Proposed Surface Disturbance), one staging area would be associated with the proposed Nageezi 101H–103H project. The staging area would be located directly north of the proposed access road and west of Encana's existing Nageezi 320H road.

Drilling and Completion

Water for drilling and completing the proposed wells would be obtained from the existing Blanco Trading Post water well (New Mexico Office of State Engineer No. SJ-2105). Water would be hauled by truck to

the proposed project areas using the proposed access roads and existing roads. Approximately 1.2 million gallons of water would be utilized to drill and complete each well.

Drilling

Once well pad, access road, and/or TUA/staging area construction has been completed for a project, a drilling rig would be transported to a proposed well pad and assembled. Drilling activities would take place 24 hours per day for approximately 2 to 3 weeks per well. During this phase, there would be constant on-site supervision. During drilling, the following equipment would be on-site: drilling rig with associated equipment, temporary office trailers equipped with sleeping quarters for essential company personnel, toilet facilities, and trash containers.

The proposed projects are targeting horizontal wells. The proposed wells would be targeting the oil and/or natural gas pools provided in Table 9. The proposed wells would be drilled from the wellheads to the bottom holes provided on the plats.

Table 9. Oil and/or Natural Gas Pools Targeted by Proposed Wells

Proposed Project	Oil and/or Natural Gas Pools
Escrito D20	Bisti Lower Gallup
Escrito E22	Basin Mancos and Bisti Lower Gallup
Escrito M21	Bisti Lower Gallup
Nageezi 101H–103H	Nageezi Unit Horizontal Oil Pool

A closed-loop system would be used for cuttings and drilling fluids. The cuttings and drilling fluids would be stored on-site in aboveground storage tanks. The storage tanks would be adequately sized to ensure confinement of all fluids and to provide sufficient freeboard to prevent uncontrolled releases. The storage tanks would be placed within bermed, secondary containment areas that would be sized to accommodate a minimum of 110% of the volume of the largest storage tank. A 20-mil liner would be installed under tanks, pumps, ancillary facilities, and truck loading/unloading areas associated with the closed-loop system.

The cuttings would be moved through a shaker system on the drill rig in order to separate drilling fluids from cuttings before being stored on-site. The cuttings would be mixed with sawdust or similar absorbent material and disposed of at Envirotech, Inc. and/or Industrial Ecosystems, Inc. permitted waste disposal facilities.

Once drilling operations have been completed, the drilling fluids would be recycled and transferred to other permitted closed-loop systems or returned to the vendor for reuse, if practical. Residual fluids would be vacuumed from the storage tanks and disposed of at Basin Disposal, Inc. and/or Industrial Ecosystems, Inc. waste disposal facilities.

Encana would use a freshwater-based drilling mud system. The surface casings for the proposed wells would be installed at an approximate depth of 500 feet. After a surface casing is installed, the casing would be cemented in place in order to create a cement sheath around the entire casing. Then, the casing would be tested to ensure cement quality and integrity. The casing and cement would stabilize the wellbore and would provide protection to overlying freshwater aquifers by isolating the hydrocarbon zones.

Prior to drilling below the surface casing, a blowout preventer would be installed on the surface casing. The blowout preventer and surface casing would be pressured tested for integrity. Following testing, a string intermediate casing would be installed. The intermediate casing would be cemented and tested to ensure cement quality and integrity.

The horizontal portion of a well would be drilled once the intermediate string has been cemented and test. A downhole mud motor would be used to increase the penetration rate during drilling. The drill rig would pump drilling fluids to drive the mud motor, cool the drill bit, and remove cuttings from the wellbore. Additives could be mixed with the mud system to achieve borehole stability, minimize potential damage to

geologic formations, provide adequate viscosity to carry the cuttings out of the wellbore, and/or reduce downhole fluid losses.

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

Completion

Following the drilling phase (once the production liners have been secured into place), the drill rig would be removed from a proposed well pad, a completion rig would be moved to a proposed well pad, and the completion phase would begin. Completion is the process in which a well is enabled to produce oil and/or natural gas. This phase can take 1 to 2 weeks for each well. During completion, the following equipment would be on-site: completion rig, completion command center, steel storage tanks, pump trucks and transports, blending and mixing facilities, and related ancillary completions equipment.

The completion rig would run a completion string into a wellbore for tying it into the liner/liner hanger. The completion string would be the same size, weight, and grade as the production liner. The completion string would provide a secondary barrier during completion operations in order to protect the intermediate casing from pressures needed to pump into the oil and/or natural gas formation.

The completion phase would require hydraulic fracturing, which is the process of injecting water, sand, and a small amount of fluid additives into the wellbore (under high pressure) to fracture the targeted oil and/or natural gas formation and release oil and/or natural gas. Within the horizontal portion of a wellbore, a series of charges would be set through the producing interval to perforate the production liner and casing and create small factures in the oil and/or natural gas formation. A fluid and sand mixture would be injected into the oil and/or natural gas formation (at high pressure) to create fractures. The sand would keep the fractures open and allow oil and/or natural gas to move more efficiently into the wellbore. This process would use a series of plugs to isolate portions of a well that have been fractured. Once this process has been completed, these plugs would be drilled out to allow the oil and/or natural gas to flow to a wellhead.

Completions would be designed with nitrogen foam for minimizing water usage and improving fluid recoveries. Flowback water, the water-based solution that flows back to the surface during and after completion operations, would be placed in on-site, aboveground storage tanks. Flowback water would be confined to a storage tank for a period that would not exceed 90 days after initial production. Flowback water would be disposed of at Basin Disposal, Inc. and/or Industrial Ecosystems, Inc. waste disposal facilities.

The final step of the completion phase would be the installation of tubing into a wellbore. The tubing would enhance production by creating a more efficient path for oil and/or natural gas to travel to a wellhead. At the wellhead, the flow of oil and/or natural gas would be regulated and controlled by a series of valves and instruments.

Construction of Well-Connect Pipelines

If the proposed wells prove to be productive, a 6-inch outside diameter steel well-connect pipeline would be constructed within a 40-foot-wide ROW for each proposed project. The lifetime of each well-connect pipeline is anticipated to be 30 to 50 years. Construction would take 4 to 5 weeks for each proposed well-connect pipeline. Each proposed well-connect pipeline would carry natural gas from the wells to the tie-in locations provided in Table 10. The lengths of each proposed well-connect pipeline are also provided in Table 10.

Table 10. Proposed Well-Connect Lengths and Tie-In Locations

Proposed Project	Length (feet)	Well-Connect Tie-In Location
Escrito D20	5,740	Escrito L17-2409 pipeline
Escrito E22	892	Nageezi 320H pipeline
Escrito M21	6,381	Escrito E22 pipeline
Nageezi 101H–103H	523	Nageezi 320H pipeline

Site preparation for each proposed well-connect pipeline would include clearing vegetation from the proposed ROW corridor and salvaging and stockpiling topsoil. Vegetation and topsoil removal would take place as described in the surface reclamation plans.

The proposed well-connect pipelines would be designed and constructed in accordance with *The Gold Book* (BLM and USFS 2007). Well-connect pipeline construction and installation would include excavating a pipe trench, stringing the pipe, bending the pipe for bends in the alignment, welding pipe segments, inspecting the pipe, coating the pipe to prevent corrosion, and lowering pipe into the trench. The construction/installment steps are outlined below.

The well-connect pipeline trench would be excavated using a trencher or track hoe. Where rock is encountered, a tractor-mounted mechanical ripper or rock trenching equipment could be used to excavate the trench. For each proposed well-connect pipeline trench, the trench would be 16 inches wide and the pipe would be buried to a minimum depth of 36 inches. At road crossings, the pipe would be buried to a depth of 48 inches. At watercourse crossings, the pipe trench would be deep enough to allow for 72 inches of soil cover between the pipe and watercourse.

After a pipe has been welded and coated, a side-boom tractor would place the pipe into the well-connect pipeline trench. The well-connect pipeline would be inspected to verify that minimum pipe cover has been provided, the trench bottom is free of rocks/debris, the external pipe coating has not been damaged, and the pipe has been properly fitted and installed in the trench. Following inspections, soils excavated from the trench would be returned to the trench and compacted to prevent subsidence. Fine soils would be used to provide rock-free pipe padding and bedding for the pipe. In rocky areas, a padding material or rock shield would be used to protect the pipe. Finally, the trench would be backfilled, location signs would be installed within 90 days of backfilling, and any related aboveground appurtenances would be installed. The aboveground equipment that would not be subject to safety requirements would be painted Juniper Green.

Interim Reclamation

If the proposed wells prove to be productive, portions of the proposed project areas that would not be required for production and operation would be reclaimed. During interim reclamation, the following equipment could be used on-site: pick-up trucks, dozer, track hoe, scraper, and tractor with a disc.

Reclamation activities are described in the surface reclamation plans. The areas to be reclaimed during interim reclamation are described in Section 2.2.2 (Proposed Surface Disturbance) and the surface reclamation plan.

Additional erosion control features, other than the erosion controls described in Section 2.2.3 (Proposed Project Design Features and Best Management Practices – Water), would be installed during interim reclamation, as necessary and as specified by the BLM FFO.

Interim reclamation could occur simultaneously with production and operation.

Production and Operation

The production phase of wells varies. The lifetime of the proposed wells is anticipated to be 30 to 50 years. The installation of production equipment would take approximately 3 to 4 weeks at each proposed project site. Production equipment that would remain on each proposed well pad would include the

following: wellheads, meter units, separators, aboveground condensate tanks, water tanks (tank batteries), meter(s), and compressor(s). All permanent (on-site for 6 months or longer) aboveground production equipment, including pumping units, would be painted Juniper Green within 3 months of installation. Facilities that are required to comply with OSHA rules and regulations would be excluded from this painting requirement.

A berm would be constructed around any production facilities that contain fluids (e.g., production tanks and produced water tanks). These berms would be constructed of compacted subsoil, corrugated metal, or an equivalent material. The berms would be impervious and would hold 110% of the capacity of the largest tank. If manifolded tanks were to be constructed, berms would also be constructed to hold 110% of the combined capacity of the manifolded tanks.

Occasionally, workover or recompletion activities would be necessary to ensure efficient production is maintained. Workovers/Recompletions would be scheduled as needed and could include repairs to wellbore equipment (e.g., casing, tubing, rods, and pumps), wellheads, or production facilities.

The maximum allowable operating pressure of each proposed well-connect pipeline would be 500 pounds per square inch gauge.

Onshore Oil and Gas Operations (43 CFR part 3160) site-security guidelines would be followed for the proposed projects. The proposed project areas would be maintained for the life of the projects.

Final Reclamation and Abandonment

If the proposed wells prove to be unproductive or when the proposed wells are no longer commercially viable, the wells would be abandoned and final reclamation would take place. The final abandonment phase typically takes 2 to 4 weeks per project location.

Downhole well abandonment would be carried out under current BLM FFO and State of New Mexico regulations. The bores would be plugged with cement and production facilities would be removed. An aboveground marker would be placed over each plugged hole and would contain individual well identification information. Encana would provide the BLM FFO with technical and environmental aspects of the final plugging, abandonment, and reclamation procedures.

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

During final reclamation, the following equipment could be utilized on-site: pick-up trucks, dozer, track hoe, scraper, and tractor with a disc. The areas to be reclaimed during final reclamation are described in Section 2.2.2 (Proposed Surface Disturbance) and the surface reclamation plans. Reclamation activities are described in the surface reclamation plans.

2.3. Alternatives Considered but Eliminated from Detailed Study

Alternatives to the Proposed Action are developed to explore different ways to accomplish the purpose and need while minimizing environmental impacts and resource conflicts and meeting other objectives of the RMP. In consistency with BLM NEPA Handbook H-1790-1, the agency “need only analyze alternatives that would have a lesser effect than the proposed action” (BLM 2008a:80). Those with greater adverse resource impacts are not considered for this analysis. Alternative locations are generally considered at the BLM pre-disturbance on-site meeting with the operator and throughout the proposed project planning process. Limitations of other nearby equipment, pipelines, access, and safety are considered, as well as resource conflicts that may require mitigation, such as rotating a well pad to protect cultural sites.

The proposed project wells would be drilled horizontally from the proposed well pads. With the utilization of horizontal drilling technologies, there is some flexibility in the placement of well pads and associated surface features and there is the potential to “twin” wells (i.e., drill more than one well from one shared well pad).

For each proposed well pad location, a surface hole location (SHL) polygon and feasibility map and SHL polygon shapefile were created for Encana's ideal well(s) location footage(s). SHL polygons were created to provide Encana, its surveyors, and its environmental consultants with information that was used in determining the best well pad location based on environmental considerations (e.g., topography, hydrology, wildlife habitat, and cultural resources), technical limitations associated with horizontal drilling resource recovery considerations and mineral rights issues. The SHL polygon and feasibility maps and SHL polygon shapefiles for the proposed projects were submitted to the BLM FFO as part of Encana's Notice of Staking for each proposed project. The maps and shapefiles are on file with the BLM FFO.

Specific siting details for each of the four proposed projects are provided below. No other potential project locations would result in less surface disturbance impacts and/or environmental impacts, and Aztec gilia/Brack's fishhook cactus habitat was unavoidable because of the locations of the mineral leases and the size of the Aztec gilia/Brack's fishhook cactus habitat area. Scoping did not identify any additional unforeseen alternatives. Therefore, only the No Action (Alternative A) and Proposed Action (Alternative B) alternatives were brought forward for detailed analysis in this EA.

2.3.1. Escrito D20

Four wells would be drilled from this proposed well pad. Using the SHL polygon and feasibility maps and SHL polygon shapefile, Encana was able to place the proposed wells 140 feet northwest of the ideal well location (1,320 feet from the north line [FNL] and 250 feet from the east line of Section 19, Township 24 North, Range 9 West).

Originally, Encana intended to develop the northern half of Section 20, Township 24 North, Range 9 West with wells drilled from east to west, which would have resulted in one to two different well pad locations. The two locations that were reviewed and the reasons for being dismissed are provided below.

- D21-2409 (695 feet FNL and 140 feet from the west line [FWL]): This location was dismissed because the drill reach would have been too far for drilling the 02H well and the surrounding area had cultural resource concerns.
- E21-2409 (1,905 feet FNL, 744 feet FWL): This location was dismissed because it would have resulted in the construction of two well pads (D21-2409 and E21-2409), two access roads, and two well-connect pipelines in order to drill the proposed wells. In addition, 744 feet FWL could have resulted in correlative rights issues, construction would have been in proximity to an existing utility line, and the surrounding area had cultural resource concerns.

Originally, Encana planned to upgrade the existing resource road that travelled through the center of Dugan's active Harvey No. 2 well pad. However, during the pre-disturbance on-site meeting, it was determined that health and safety concerns could arise by having vehicles travel through the center of the active well pad. Therefore, approximately 630 feet of new access road (STA 39+87.57 to STA 46+17.82) would be rerouted around the northern side of the Harvey No. 2 well pad.

2.3.2. Escrito E22

Three wells would be drilled from this proposed well pad. Using the SHL polygon and feasibility maps and SHL polygon shapefile, Encana was able to place the proposed wells 100 feet southwest of the ideal well location (1,320 feet FNL and 250 feet FWL of Section 22, Township 24 North, Range 9 West).

As stated in Section 2.2.2 (Proposed Surface Disturbance), approximately 690 feet of the proposed access road (STA 0+00.00–6+90.00) would overlap the proposed Escrito M21 access road, and corner 5 of the proposed well pad construction zone would be rounded to avoid the need for a large amount of fill within this portion of the proposed project.

2.3.3. Escrito M21

Two wells would be drilled from this proposed well pad. Using the SHL polygon and feasibility maps and SHL polygon shapefile, Encana was able to place the proposed wells 20 feet east of the ideal well

location (1,320 feet from the south line [FSL] and 250 feet FWL of Section 21, Township 24 North, Range 9 West).

Encana attempted to overlap existing disturbance (i.e., two-track road) for the majority of the proposed access road. However, approximately 2,770 feet of the existing two-track road located directly south and southeast of the proposed access road (approximate STA 8+80.00 to STA 36+50.00) could not be overlapped by the proposed access road due to an existing stock pond and erosional issues associated with a watercourse located adjacent to and paralleling the existing two-track road. As a result, Encana shifted the proposed access road north and northwest of the existing two-track road to avoid these environmental resources. Additionally, during interim reclamation, the 2,770-foot-long portion of the existing two-track road not being overlapped by the proposed access road would be closed, disked, and reseeded.

2.3.4. Nageezi 101H–103H

Three wells would be drilled from this proposed well pad. Using the SHL polygon and feasibility maps and SHL polygon shapefile, Encana was not able to place the proposed wells at or within proximity to the ideal well location (1,320 feet FSL and 250 feet FWL of Section 22, Township 24 North, Range 9 West). The proposed wells are located 450 feet north of the ideal well location because of topographic constraints that were present at the ideal well location and within other portions of the SHL polygon.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the environment that would be affected by implementing the alternatives described in Chapter 2. The resource issues under analysis were identified in Chapter 1 (Section 1.6.2 [Issues to be Analyzed]). Aspects of the affected environment described in this chapter focus on the relevant major resources or issues/concerns. NEPA requires that the discussion of issues and concerns are commensurate with the potential impacts: “1500.4 (c) Impacts shall be discussed in proportion to their significance.” Other CEQ regulations make it clear that discussion of all resources is not necessary, only those that are significant: “1501.7 (3) Identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3), narrowing the discussion of these issues in the statement to a brief presentation of why they will not have a significant effect.” As discussed below, that environment has been affected by 0.7% to 1.0% of past disturbance.

On the basis of CEQ guidance and BLM NEPA Handbook H-1790-1, the following discussion is limited to those resources that could be impacted to a degree that detailed analysis is warranted (40 CFR 1502.15; BLM 2008a:96). However, certain elements of the human environment are required by statute, regulation, or EO to be examined in all EAs. The No Action alternative (Alternative A) reflects the current situation within the proposed project areas and will serve as the baseline for comparing the environmental impacts of the Proposed Action (Alternative B).

The affected environment description is followed by a discussion of potential impacts from the Proposed Action (Alternative B), including cumulative impacts. Potential mitigation for the resources impacted by the Proposed Action are described in Chapter 2 (Section 2.2.3 [Proposed Project Design Features and Best Management Practices]).

3.1. Methodology

3.1.1. Direct and Indirect Impacts

This EA addresses the affected resources and impacts on a site-specific basis as required by NEPA. For each resource analyzed, the impacts discussion identifies:

- Direct impacts – impacts that are caused by the action and occur at the same time and in the same general location as the action.
- Indirect impacts – impacts that occur at a different time or in a different location than the action to which the impacts are related.
- Short- or long-term impacts – the duration of impacts are described as short or long term. For the purposes of this EA, short-term impacts occur within the first 2 years which includes the construction, drilling, completion, and interim reclamation phases and time for revegetation to progress. Long-term impacts occur beyond the first 2 years and apply to the production and operation phases and the overall life of the proposed projects through eventual decommissioning.

For the purposes of providing baseline data for the affected environment and identifying potential impacts, an impact analysis area for each resource was delineated, as appropriate. These impact analysis areas apply to direct and indirect impacts in order to provide context to the Proposed Action, as well as cumulative impacts. These analysis areas are described in Table 11.

Table 11. Impact Analysis Areas by Resource

Resource	Analysis Area	Total Acreage of Analysis Area	Temporal Boundary
Air Quality and Climate	See Section 3.2.2		
Soil Water Upland Vegetation Noxious Weeds and Invasive Species Wildlife Special Status Species Cultural	The analysis area is the Hydrologic Unit Code (HUC) 10-digit watershed called Blanco Canyon (1408010305) intersected by the proposed project areas. This area was chosen because it is an area with clear natural topographical boundaries with vegetative connectivity, similar soil types, and hydrological functionality. (Figure 4).	169,788	2 years (short-term) More than 2 years (long-term)
Livestock Grazing	Highway 57 Allotment (Allotment No. 27658)	29,798	2 years (short-term) More than 2 years (long-term)
Environmental Justice and Socioeconomics	Qualitative analysis; see Section 3.11.2		
Public Health and Safety	Qualitative analysis; see Section 3.12.2		

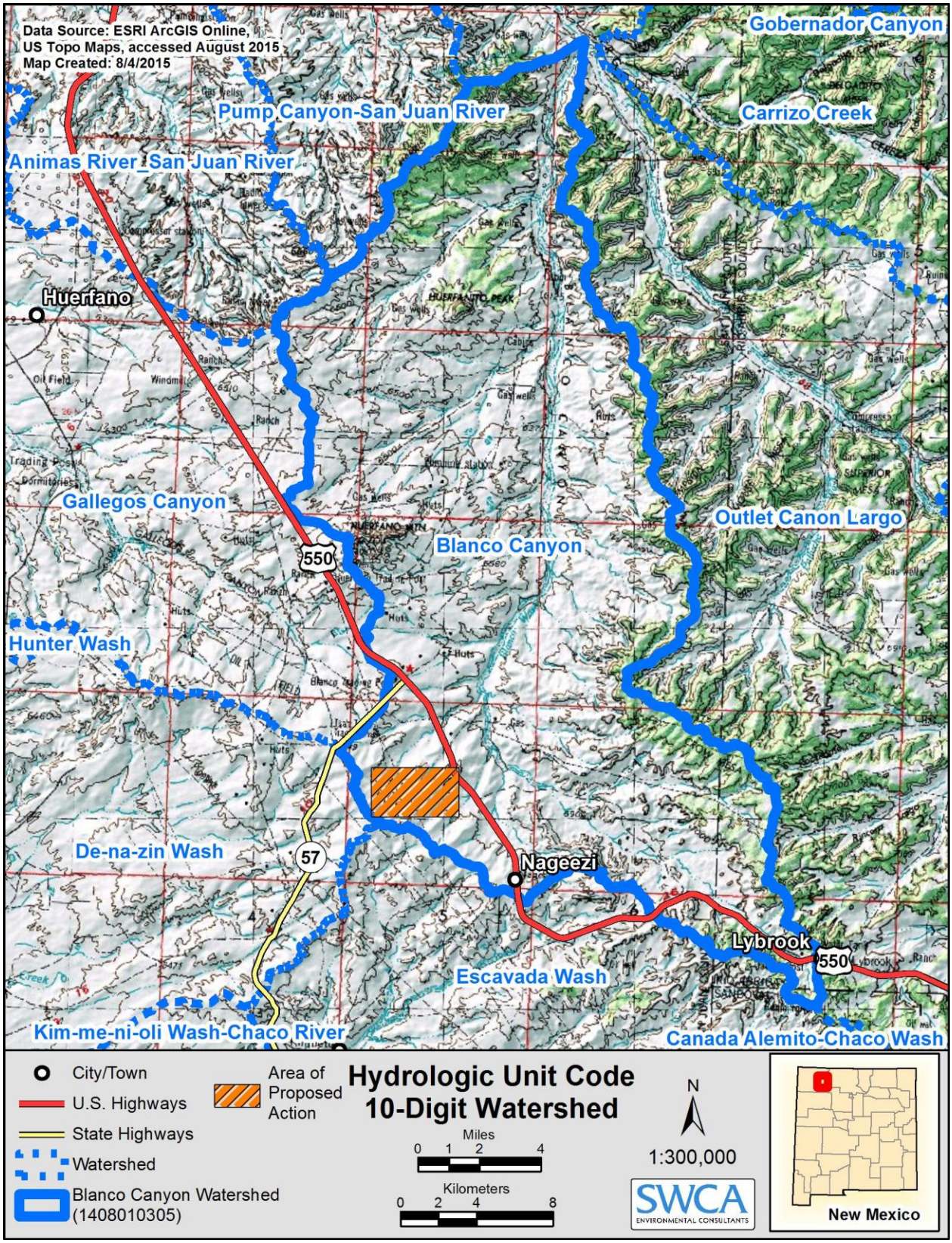

Figure 4. Proposed Action within the Blanco Canyon Watershed (HUC 1408010305).

3.1.2. Cumulative Impacts

An RFD was prepared for the BLM FFO in October 2014 (Engler et al. 2014). The RFD identified high, moderate, and low potential regions for oil development of the Mancos-Gallup formation. Within the high potential region, full development would include five wells per section, resulting in 1,600 completions. Within the moderate potential region, full development would include one well per section, resulting in 330 completions. Within the low potential region, full development would include one well per township, resulting in 30 well completions. Additionally, the RFD predicted 2,000 gas wells could be development in the northeastern corner of the BLM FFO's planning area.

The following methods and assumptions were used to predict the potential impact of the development predicted in the RFD.

Past Oil and Gas Development

Past oil and gas wells were identified using ONGARD (Oil and Natural Gas Administration and Revenue Database). Following interim reclamation, the average well pad size for past development is 0.75 acre per well pad. Aerial photographs were analyzed to identify past disturbances in addition to existing oil and/or gas wells, highways, county roads, and BLM roads and ROWs. Table 12 shows the approximate amount of existing past disturbance in acres.

Table 12. Past Disturbance by Impact Analysis Areas

Impact Analysis Area	Past Disturbance (acres)	Percentage of Analysis Area
HUC 10-digit watershed: Blanco Canyon (1408010305)	1,150	0.7%
Highway 57 Allotment (Allotment No. 27658)	182	0.6%

Present and Future Oil Development

Based on previous development, it was assumed that development of the high potential region would involve the twinning of well pads. This is the placement of two or more wells on one well pad. The assumption for the analysis is that the development of a section would include two twinned well pads and one single well pad, resulting in three well pads for five wells. In the moderate and low potential regions, it was assumed that development would involve single well pads. The Proposed Action is located in the high potential region.

The average well pad size for a twinned well pad was assumed to be 500 × 530 feet, or 6.08 acres. An additional 0.6 acre was added to account for any associated road or pipeline development, resulting 6.68 acres of short-term disturbance. Following completion of the well, interim reclamation of the well pad and reclamation of any pipelines would occur, resulting in 1.5 acres of long-term disturbance.

The average well pad size for a single well pad was assumed to be 500 × 500 feet, or 5.74 acres. Again, an additional 0.6 acre was added to account for associated road or pipeline development, resulting in 6.34 acres of short-term disturbance. Following completion of the well, interim reclamation of the well pad and reclamation of any pipelines would occur, resulting in 1.5 acres of long-term disturbance.

The Random Point Tool in ArcMap was used to randomly assign points representing well pads and associated disturbance based on the RFD assumptions: five wells per section in the high potential region, one well per section in the moderate potential region, and one well per township in the low potential region. This allowed both long- and short-term disturbance from oil development of the Mancos-Gallup formation to be calculated for the analysis areas used in this EA.

Table 13 identifies the potential disturbance in acres from reasonably foreseeable future oil wells.

Table 13. RFD Disturbance by Impact Analysis Area

Impact Analysis Area	Short-Term Disturbance		Long-Term Disturbance	
	Present and RFD (acres)	Percentage of Analysis Area	Present and RFD (acres)	Percentage of Analysis Area
HUC 10-digit watershed: Blanco Canyon (1408010305)	2,179	1.3%	512	0.3%
Highway 57 Allotment (Allotment No. 27658)	438	1.5%	104	0.4%

Present and Future Gas Development

These proposed projects do not affect the gas prone area identified in the RFD. Therefore, no gas wells were identified to be developed in the analysis areas identified for the proposed projects.

Present and Future Livestock Grazing

Past, present, and future livestock grazing are included in the RFD. Livestock grazing is managed by the BLM FFO, which grants active animal unit months (AUMs) for each grazing allotment in the BLM FFO planning area. An AUM is the amount of forage needed to sustain a cow (1,000 pound) or cow/calf pair for one month.

3.2. Air Resources

3.2.1. Affected Environment

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

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

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

recently to implement Clean Air Act requirements for GHG emissions. Climate has the potential to influence renewable and non-renewable resource management.

Air Quality

Criteria Air Pollutants

The Air Resources Technical Report describes the types of data used for description of the existing conditions of criteria pollutants, how the criteria pollutants are related to the activities involved in oil and gas development, and provides a table of current national and state standards. The EPA's Green Book webpage (EPA 2013a) reports that all counties in the BLM FFO area are in attainment of all NAAQS as defined by the Clean Air Act. The area is also in attainment of all state air quality standards (New Mexico Ambient Air Quality Standards [NMAAQS]). *The current status of criteria pollutant levels in the BLM FFO are described below.*

"Design Values" are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. The 2012 design values for criteria pollutants are listed below in Table 14. There is no monitoring for CO and Pb in San Juan County, but because the county is relatively rural, it is likely that these pollutants are not elevated. PM_{10} design concentrations are not available for San Juan County.

Table 14. 2012 Criteria Pollutant Monitored Design Values in San Juan County

Pollutant	2012 Design Concentration	Averaging Time	NAAQS	NMAAQS
O_3	0.071 ppm	8-hour	0.075 ppm[1]	
NO_2	13 ppb	Annual	53 ppb[2]	50 ppb
NO_2	38 ppb	1-hour	100 ppb[3]	
$PM_{2.5}$	4.7 µg/m^3	Annual	12 µg/m^{3,4}	60 µg/m3,6
$PM_{2.5}$	14 µg/m^3	24 hour	35 µg/m^{3,3}	150 µg/m3,6
SO_2	19 ppb	1-hour	75 ppb[5]	

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

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

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

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

Although the AQI in the region has reached the level considered unhealthy for sensitive groups on several days almost every year in the last decade, there are no patterns or trends to the occurrences (Table 15). On 8 days in the past decade, air quality has reached the level of "unhealthy" and on two days, air quality reached the level of "very unhealthy." In 2009 and 2012, there were no days that were

"unhealthy for sensitive groups" or worse in air quality. In 2005 and 2013, there was one day that was "unhealthy" during each year. In 2010, there were five "unhealthy" days and two "very unhealthy days."

Table 15. Number of Days Classified as "Unhealthy for Sensitive Groups" (AQI 101–150) or Worse

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

Source: EPA 2013b

Hazardous Air Pollutants

The Air Resources Technical Report discusses the relevance of hazardous air pollutants (HAPs) to oil and gas development and the particular HAPs that are regulated in relation to these activities (BLM 2014a). The EPA conducts a periodic National Air Toxics Assessment (NATA) that quantifies HAP emissions by county in the U.S. The purpose of the NATA is to identify areas where HAP emissions result in high health risks and further emissions reduction strategies are necessary. A review of the results of the 2005 NATA shows that cancer, neurological, and respiratory risks in San Juan County are generally lower than statewide and national levels as well as those for Bernalillo County where urban sources are concentrated in the Albuquerque area (EPA 2012).

Climate

The analysis area is located in a semiarid climate regime typified by dry windy conditions and limited rainfall. Summer maximum temperatures are generally in the range of 80 or 90 degrees Fahrenheit (°F), and winter minimum temperatures are generally in the teens to 20s. Temperatures occasionally reach above 100°F in June and July and have dipped below zero in December and January. Precipitation is divided between summer thunderstorms associated with the Southwest monsoon and winter snowfall as Pacific weather systems drop south into New Mexico. Table 16 shows climate normals for the 30-year period from 1981 to 2010 for the Farmington, New Mexico, area.

Table 16. Climate Normals for the Farmington Area, 1981–2010

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

Source: data collected at New Mexico State Agricultural Science Center - Farmington
[1] degrees Fahrenheit

Very recently, pioneering research using space-borne (satellite and aircraft) determination of methane concentrations have indicated anomalously large methane concentrations may occur in the Four Corners region (Kort et al. 2014). A subsequent study (Schneising et al. 2014) indicated larger anomalies over other oil and gas basins in the U.S. Methane is 34 times more potent at trapping GHG emissions than CO2 when considering a time horizon of 100 years (Intergovernmental Panel on Climate Change 2013). While space-borne studies can determine the pollutant concentration in a column of air, these studies cannot pinpoint the specific sources of air pollution. Further study is required to determine the sources

responsible for methane concentrations in the Four Corners region; however, it is known that a significant amount of methane is emitted during oil and gas well completion (Howarth et al. 2011). Methane is also emitted from process equipment, such as pneumatic controllers and liquids unloading, at oil and gas production sites. Ground-based, direct source monitoring of pneumatic controllers conducted by the Center for Energy and Environmental Resources (Allen et al. 2014a) show that methane emissions from controllers exhibit a wide range of emissions and a small subset of pneumatic controllers emitted more methane than most. Emissions measured in the study varied significantly by region of the U.S., the application of the controller and whether the controller was continuous or intermittently venting. The Center for Energy and Environmental Resources had similar findings of variability of methane emissions from liquid unloading (Allen et al. 2014b). In October 2012, the EPA promulgated air quality regulations controlling volatile organic compound (VOC) emissions at gas wells. These rules require air pollution mitigation measures that reduce the emissions of VOCs. These same mitigation measures have a co-benefit of reducing methane emissions. Future ground-based and space-borne studies planned in the Four Corners region with emerging pollutant measurement technology may help to pinpoint significant, specific sources of methane emissions in the region.

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

3.2.2. Impacts from Proposed Action

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

Direct and Indirect Impacts

Criteria Pollutants

Table 17 shows estimated emissions from one proposed horizontal oil well for criteria pollutants, VOCs and GHGs. For comparison, Table 18 shows total human-caused emissions for each of the counties in the FFO and La Plata County, Colorado, based on the EPA's 2011 emissions inventory (EPA 2014b).

Table 17. Criteria Pollutant and VOC Emissions Estimated for Construction of One Horizontal Oil Well; Average 25 Days to Drill and Complete

Activity	NO_x	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH4	CO_2
One time operations (tons)								
Construction	5.5	1.5	0.5	2.5	0.25	0.1	0.007	598.85
Completion	0.5	0.1	0.03	0.025	0.025	-	-	55.00
Interim Reclamation	0.006	0.006	0.006	0.001	-	0.003	-	1.24
Final Reclamation	0.006	0.006	0.006	0.001	-	0.004	-	1.66
Ancillary operations (tons)								
Workover	0.129	0.04	0.01	0.01	0.01	-	-	10.59
Road Maintenance	-	-	-	-	-	-	-	0.26
Road Traffic	-	-	-	-	-	-	-	0.06

Activity	NO_x	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	CH4	CO_2
Annual operations (tons/yr)								
Oil Haul Truck and Small Truck (100 bbl/day)	0.009	0.006	0.0012	0.0009	0.0008	-	0.0001	3.88
Total	***6.13***	***1.64***	***0.55***	***2.54***	***0.29***	***0.11***	***0.01***	***671.54***

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

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

Table 18. Analysis Area Emissions in Tons/Year, 2011

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

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

Table 19 displays the percent increase in total emissions in the analysis area from the Proposed Action to construct and operate one horizontal oil well.

Table 19. Percent Increase in Analysis Area Emissions from the Proposed Action

	NO_X[1]	CO[2]	VOC[3]	PM_{10}[4,5]	$PM_{2.5}$[5,6]	SO_2[5,7]
Total Emissions	75,187.7	144,551.5	57,265.1	222,168.9	26,407.2	7,237.9
Conventional Gas Well Emissions	6.13	1.64	12.55[(8)]	2.54	0.29	0.11
Percent Increase	***0.008***	***0.001***	***0.02***	***0.001***	***0.001***	***0.002***

[1] NO_X – nitrogen oxides
[2] CO – carbon monoxide
[3] VOC – volatile organic compounds
[4] PM_{10} – particulate matter with an aerodynamic diameter equal to or less than 10 microns
[5] Values derived from average emissions for any well drilling in the analysis area. Calculated results available upon request.
[6] $PM_{2.5}$ – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
[7] SO_2 – sulfur dioxide
[8] Current EPA regulations require operators to reduce VOC emissions by 95% if their oil storage tanks emit over six tons of VOC emissions per year

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% of VOC emissions. Therefore, the estimated HAP emissions of 1.25 tons/year should be considered a very gross estimate. Most of the VOC emissions estimated for one horizontal oil well result from venting from oil storage tanks. Current EPA regulations require operators to reduce VOC emissions by 95% if their oil storage tanks emit over 6 tons of VOC

emissions per year. A reduction of 95% of oil storage tank VOC emissions would reduce the estimated HAP emissions to 0.12 tons/year.

Total Greenhouse Gases

The available statewide GHG summary combines GHG emissions from CO_2 and CH_4. To compare the GHG emissions from the Proposed Action estimated by the calculator with statewide GHG emissions, carbon dioxide equivalent (CO_2e) emissions for both CH_4 and CO_2 were summed. The total statewide GHG emission estimate for 2007 was 76,200,000 metric tons CO_2e (76.2 million metric tons (NMED 2010). The estimated CO_2e metric tons emissions from one horizontal oil well (609.2 metric tons) would represent a 0.0008% increase in New Mexico CO_2 emissions.

Cumulative Impacts

The BLM FFO manages federal hydrocarbon resources in San Juan, Sandoval, Rio Arriba, and McKinley Counties. There are approximately 21,150 active oil and gas wells in the San Juan Basin. About 14,843 of the wells in these counties are federal wells. Analysis of cumulative impacts for reasonable development scenarios and RFD of oil and gas wells on public lands in the BLM FFO was presented in the 2003 RMP. This included modeling of impacts on air quality. A more detailed discussion of Cumulative Effects can be found in the Air Resources Technical Report (BLM 2014a).

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

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

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

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

3.3. Soil Resources

3.3.1. Affected Environment

The proposed project areas are in the San Juan Basin, a large depressed drainage basin in northwestern New Mexico and southwestern Colorado. The San Juan Basin is bordered by the Defiance Uplift and Chuska Mountains to the west, the San Juan Dome to the north, the Chaco Slope and Zuni Uplift to the south, and the Nacimiento Uplift to the east. In total, the San Juan Basin covers an area 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 Natural Resources Conservation Service (2015), two soil types are mapped within the proposed project areas (Table 20). None of these soils are classified as fragile soils by the BLM FFO. Full descriptions of each soil type in the project area are provided in the BSR.

Table 20. Soils in the Proposed Project Areas

Soil Type	Percentage of Project Area
Escrito D20	
BT – Blancot-Notal association, gently sloping	58%
FX – Fruitland-Persayo-Sheppard complex, hilly	42%
Escrito E22	
BT – Blancot-Notal association, gently sloping	12%
FX – Fruitland-Persayo-Sheppard complex, hilly	88%
Escrito M21	
BT – Blancot-Notal association, gently sloping	73%
FX – Fruitland-Persayo-Sheppard complex, hilly	27%
Nageezi 101H–103H	
BT – Blancot-Notal association, gently sloping	48%
FX – Fruitland-Persayo-Sheppard complex, hilly	52%

Source: Natural Resources Conservation Service (2015).

3.3.2. Impacts from Proposed Action

Direct and Indirect Impacts

New surface disturbance associated with the proposed projects would be 40.9 acres. Of this, 11.7 acres would be long-term disturbance and would remain as bare, compacted surface for the life of the proposed projects. The remaining 29.2 acres would be short-term disturbance and would be reclaimed during interim reclamation.

Construction activities would result in mixing, displacement, and compaction of soils within the proposed project areas. Soils within the proposed project areas are classified as having low to moderate potential for wind erosion and moderate potential for water erosion (Natural Resources Conservation Service 2015). The removal of vegetation within the proposed project areas could result in increased soil erosion within and downstream of the proposed project areas. The degree of erosion would be dependent upon precipitation and wind.

Indirect impacts to soil resources could include a change to the overall productivity from the accidental mixing of topsoil with subsoil during grading and trenching activities. In addition, there could be the potential for noxious weeds and/or invasive species to colonize the disturbed soils within the proposed project areas. In general, weeds outcompete native species because of their ability to thrive under conditions with low soil water content, poor nutrient availability, and coarse textures.

The design features and BMPs for the proposed projects (see Section 2.2.3) and the reclamation procedures provided in the surface reclamation plans have been developed to minimize impacts to soil and maximize the potential for successful reclamation.

Cumulative Impacts

The analysis area (watershed) and impact indicator (acres) for soil resources is the same for cumulative impacts as for direct and indirect impacts. Impacts from past actions within the 169,788-acre analysis area (Blanco Canyon Watershed [HUC 1408010305]) include approximately 1,150 acres of surface disturbance, including past construction of 341 oil and gas well pads and associated roads and pipelines

and decades of managed livestock grazing. Past actions account for soil disturbance on approximately 0.7% of the analysis area. Reclamation of some disturbed areas and use of BMPs for erosion control and storm water events has reduced impacts to soil resources by improving vegetative cover from construction conditions and reducing soil loss.

Based on the RFD scenario (Engler et al. 2014), present and future oil and gas development in the analysis area could result in an additional 2,179 acres (1.3% of the analysis area) of additional surface disturbance and 512 acres (0.3% of the analysis area) of long-term surface disturbance within the analysis area. Present and future livestock grazing could result in additional surface disturbance within the analysis area. In addition to the impacts described above for direct and indirect impacts, impacts to soils would depend on the placement and type of surface disturbance, the type of soil, and the hydrologic conditions within the individual project areas. Generally, soil erosion and sedimentation of local drainages would be expected to occur, especially when storm events occur during construction of the future actions. The proposed projects would require BMPs and other mitigation to reduce these impacts.

The Proposed Action would add approximately 41 acres of surface disturbance to the past, present, and reasonably foreseeable actions calculated above (0.7 % of the Blanco Canyon Watershed [HUC 1408010305] for soil resources). Together, the cumulative surface disturbance would total 3,370 acres (2.0% of the Blanco Canyon Watershed [HUC 1408010305] for soil resources) of short-term surface disturbance and 1,674 acres (1.0% of the Blanco Canyon Watershed [HUC 1408010305]) of long-term surface disturbance within the analysis area.

3.4. Surface Water Resources

3.4.1. Affected Environment

As stated in Section 3.1 (Methodology), the proposed projects cross one 10-digit HUC, the Blanco Canyon Watershed.

Under the CWA, the USACE has jurisdiction over waters of the U.S. Waters of the U.S. have a “significant nexus” to traditional navigable waters. The BLM FFO and USACE Albuquerque District – Durango Regulatory Office have determined that waters of the U.S. within the BLM FFO planning area may include USGS watercourses (i.e., blue lines on USGS 1:24,000 topographic maps). In addition, defining elements of potential waters of the U.S. include discernible ordinarily high water marks (OHWMs), defined bed and banks, or the three mandatory wetland criteria: hydrophytic vegetation, hydric soils, and wetland hydrology.

As stated in Chapter 1 (see Section 1.6.3 [Issues Considered but Not Analyzed]) and the BSR, biological surveys of the proposed project areas were conducted in April and May 2015. The surveys included an analysis for the presence of potential waters of the U.S., including wetlands and special aquatic sites.

No wetlands or special aquatic sites are present within the proposed project areas. In addition, there are no New Mexico Outstanding National Resource Waters within or adjacent to the proposed project areas.

Escrito D20

Four USGS watercourses were mapped within the proposed project area (one within the well pad and construction zone, one within the TUA, and three within the access road and well-connect pipeline corridors) (USGS 2013). During SWCA’s 2015 biological surveys, the USGS watercourse crossings within the well pad and TUA were determined to not have a discernable OHWM, and the USGS watercourse crossings within the access road and well-connect pipeline corridors were determined to have discernible OHWMs. These three watercourses are unnamed ephemeral drainages that flow to unnamed tributaries of Blanco Wash.

Escrito E22, Escrito M21, and Nageezi 101H–103H

No USGS watercourses are mapped within surface disturbance areas for the proposed Escrito E22, Escrito M21, and Nageezi 101H–103H project areas (USGS 2013). During SWCA's 2015 biological surveys, no waters of the U.S. were identified with the proposed surface disturbance areas.

3.4.2. Impacts from the Proposed Action

Direct and Indirect Impacts

Impact criteria for assessing water resources impacts are based on applicable laws, statutes, standards, or implementation plans. Significant direct and indirect impacts from the Proposed Action can be assessed by determining the number of potential waters of the U.S. to be crossed by the proposed projects and acres of disturbance within potential waters of the U.S. in comparison to regulatory thresholds.

As stated above and within the BSR, three potential waters of the U.S. were identified within proposed the Escrito D20 project area. Table 21 summarizes proposed disturbance to potential waters of the U.S. for the proposed project. If these watercourses are considered waters of the U.S., proposed activities associated with the crossings would meet the requirements to be covered under the USACE Nationwide Permits 12 (Utility Line Activities) and 14 (Linear Transportation Projects).

Table 21. Impacts to Potential Waters of the U.S.

Unique ID	OHWM Width (feet)	Temporary Impacts (acres)
S2	5	0.01
S3	10	0.01
S4	5	0.01
Total		***0.03***

Hydrostatic test water would be disposed of at a permitted off-site disposal facility after testing of the proposed well-connect pipelines. No surface discharge is intended or planned. Therefore, a discharge permit would not be required for the proposed projects.

Cumulative Impacts

The analysis area (watershed) and impact indicator (acres) for surface water resources is the same for cumulative impacts as for direct and indirect impacts. Impacts from past actions within the 169,788-acre analysis area (Blanco Canyon Watershed [HUC 1408010305]) include approximately 1,150 acres of surface disturbance, including past construction of 341 oil and gas well pads and associated roads and pipelines. Past actions account for surface disturbance, which could result in soil erosion to local water bodies, on approximately 0.7% of the analysis area. Reclamation of some disturbed areas and use of BMPs for erosion control and storm water events has reduced impacts to surface water resources by improving vegetative cover from construction conditions and reducing erosion potential.

Based on the RFD scenario (Engler et al. 2014), present and future oil and gas development in the analysis area could result in an additional 2,179 acres (1.3% of the analysis area) of additional disturbance and 512 acres (0.3% of the analysis area) of long-term surface disturbance within the analysis area. In addition to the impacts described above for direct and indirect impacts, impacts to surface water resources would depend on the placement and type of surface disturbance, the type of soil, and the hydrologic conditions within the individual project areas. Generally, soil erosion and sedimentation of local drainages would be expected to occur, especially when storm events occur during construction of the future actions. The proposed projects would require BMPs and other mitigation to reduce these impacts.

The Proposed Action would add approximately 41 acres of surface disturbance to the past, present, and reasonably foreseeable actions calculated above (0.7% of the Blanco Canyon Watershed [HUC 1408010305] for surface water resources). Together, the cumulative surface disturbance would total 3,370 acres (2.0% of the Blanco Canyon Watershed [HUC 1408010305] for surface water resources) of short-term surface disturbance and 1,674 acres (1.0% of the Blanco Canyon Watershed [HUC 1408010305]) of long-term surface disturbance within the analysis area.

3.5. Upland Vegetation

3.5.1. Affected Environment

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

Southwest Regional Gap Analysis Project data indicate that five land cover types are present within and surrounding the project areas: Colorado Plateau Piñon-Juniper Woodlands, Inter-Mountain Basins Big Sagebrush Shrubland, Inter-Mountain Basins Semi-Desert Shrubland Steppe, Inter-Mountain Basins Semi-Desert Grassland, and Inter-Mountain Basins Greasewood Flat (USGS 2004). During the biological surveys, biologists identified five general vegetation communities within the proposed project areas: sagebrush shrublands along rolling hills and valleys, open piñon-juniper woodlands along the rolling hills, piñon-juniper woodland along rolling to modernly sloped hills, intermixed badland outcrops, and reclaimed areas along existing utility corridors. The vegetation communities for each proposed project are provided below. Descriptions of the Southwest Regional Gap Analysis project land cover types and additional details regarding the field-verified vegetation communities are provided in the BSR.

Escrito D20

Four vegetation communities were identified within the proposed project area: sagebrush shrublands (42% of the project area), open piñon-juniper woodlands (14% of the project area), badland outcrops (1% of the project area), and reclaimed areas (43% of the project area). Twoneedle pine, Utah juniper (*Juniperus osteosperma*), and oneseed juniper (*J. monosperma*) are present within the proposed project area, with approximately 180 trees (78% mature trees, 17% juvenile trees, and 5% standing-dead trees). Vegetative cover within and surrounding the proposed project area is approximately 10% to 75%. Past uses include livestock grazing activities and oil and gas development activities, such as existing utility line ROWs and lease roads.

One of the plant species (Brack's fishhook cactus) identified in the proposed project area corresponds to a special-status species that is listed by the BLM and State of New Mexico; this species is discussed further in Section 3.8 (Special Status Species).

Escrito E22

One vegetation community was identified within the proposed project area: piñon-juniper woodland. Approximately 400 trees are present within the proposed project area (90% mature trees, 5% juvenile trees, and 5% standing-dead trees). Vegetative cover within and surrounding the proposed project area is approximately 40% to 50%. Past uses include livestock grazing activities.

Escrito M21

Two vegetation communities were identified within the proposed project area: sagebrush shrublands (35% of the project area) and piñon-juniper woodlands (65% of the project area). Twoneedle pine, Utah juniper, and oneseed juniper are present within the proposed project area, with approximately 325 to 450 trees (93% mature trees, 5% juvenile trees, and 2% standing-dead trees). Vegetative cover within and surrounding the proposed project area is approximately 30% to 60%. Past uses include livestock grazing activities and an existing two-track road.

One of the plant species (Brack's fishhook cactus) identified in the proposed project area corresponds to a special-status species that is listed by the BLM and State of New Mexico; this species is discussed further in Section 3.8 (Special Status Species).

Nageezi 101H–103H

Two vegetation communities were identified within the proposed project area: sagebrush shrublands (62% of the project area) and open piñon-juniper woodlands (38% of the project area). Twoneedle pine, Utah juniper, and oneseed juniper are present within the proposed project area, with approximately 200 trees (90% mature trees, 5% juvenile trees, and 5% standing-dead trees). Vegetative cover within and surrounding the proposed project area is approximately 40% to 90%. Past uses include livestock grazing activities.

3.5.2. Impacts from Proposed Action

Direct and Indirect Impacts

During the construction phase, all vegetation within the 40.9-acre area associated with the proposed projects would be cleared and directly impacted. Short-term impacts (29.2 acres) would occur during site preparation and would continue until revegetation of the proposed project areas by faster-growing plants is achieved, which is estimated to be 2 years after the interim reclamation phase. Long-term, permanent impacts (11.7 acres) would remain as compacted, barren surface for the life of the proposed wells. During final reclamation, Encana would reclaim all portions of the proposed project areas that were not reclaimed during interim reclamation.

It was determined during the pre-disturbance on-site meeting that the communities listed below best represent the proposed project areas. During interim and final reclamation, the seed mixtures associated with those vegetation communities would be used for the proposed projects. Proposed reclamation activities and seed mixtures are described further in the surface reclamation plans.

- Escrito D20: sagebrush community
- Escrito E22: piñon-juniper community
- Escrito M21: piñon-juniper community for the well pad (including construction zone) and sagebrush community for the access road and well-connect pipeline corridors
- Nageezi 101H–103H: piñon-juniper community

Re-established vegetation would consist of native species included in the seed mixtures and native species that are not deliberately planted. There is also the potential for noxious weeds and invasive species to become established within the proposed project areas; these species and their impacts are described in Section 3.6 (Noxious Weeds and Invasive Species). Although the replanting of disturbed soils could successfully establish vegetation in some portions of the proposed project areas (i.e., with a biomass and species richness similar to those of local native communities), the resulting plant

communities could be quite different from native communities in terms of species composition and representation of particular vegetation types. The community composition of reclaimed areas would likely be greatly influenced by the species that are initially seeded, and colonization by species from nearby native communities could be slow. Within reclaimed areas, it is not expected that the vegetation community would return to native conditions within 20 years (BLM 2003a:4–18).

Indirectly, the deposition of fugitive dust generated during vegetation-clearing activities, during the use of the proposed well pads and access roads, and during wind events could reduce photosynthesis and productivity of the surrounding vegetation (Thompson et al. 1984; Hirano et al. 1995). The deposition of fugitive dust could also increase water loss in plants near the proposed project areas (Eveling and Bataille 1984). Plant community composition surrounding the proposed project areas could subsequently be altered, resulting in habitat degradation. BMPs to control fugitive dust are incorporated into the project design features found in Section 2.2.3.

Cumulative Impacts

The analysis area (watershed) and impact indicator (acres) for upland vegetation is the same for cumulative impacts as for direct and indirect impacts. Impacts from past actions within the 169,788-acre analysis area (Blanco Canyon Watershed [HUC 1408010305]) include approximately 1,150 acres of surface disturbance, including past construction of 341 oil and gas well pads and associated roads and pipelines and decades of managed livestock grazing. Past actions account for surface disturbance and vegetation removal on approximately 0.7% of the analysis area. Reclamation of some disturbed areas and use of BMPs, such as interim reclamation, has reduced impacts to vegetation.

Based on the RFD scenario (Engler et al. 2014), present and future oil and gas development in the analysis area could result in an additional 2,179 acres (1.3% of the analysis area) of additional surface disturbance and 512 acres (0.3% of the analysis area) of long-term surface disturbance within the analysis area. Present and future livestock grazing could result in additional surface disturbance within the analysis area. In addition to the impacts described above for direct and indirect impacts, impacts to vegetation would depend on the placement and type of surface disturbance and the plant species present within the individual project areas. Generally, native vegetation loss and the spread of noxious weeds and invasive species would be expected to occur, especially during construction of the future actions. The proposed projects would require BMPs and other mitigation to reduce these impacts. In time, the reclaimed areas would result in stable plant communities with densities that are similar to the pre-disturbance plant densities.

The Proposed Action would add approximately 41 acres of surface disturbance to the past, present, and reasonably foreseeable actions calculated above (0.7% of the Blanco Canyon Watershed [HUC 1408010305] for upland vegetation). Together, the cumulative surface disturbance would total 3,370 acres (2.0% of the Blanco Canyon Watershed [HUC 1408010305] for upland vegetation) of short-term surface disturbance and 1,674 acres (1.0% of the Blanco Canyon Watershed [HUC 1408010305]) of long-term surface disturbance within the analysis area.

3.6. Noxious Weeds and Invasive Species

3.6.1. Affected Environment

The Federal Noxious Weed Act of 1975 and Plant Protection Act of 2000 establish a federal program for controlling the spread of noxious weeds. Under the Plant Protection Act, noxious weeds are defined as “any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the U.S., the public health, or the environment.” The U.S. Department of Agriculture (USDA) designates plants as noxious weeds to control, eradicate, and prevent the spread of these weeds. The USDA has designated 88 species as federally listed noxious weeds to be targeted for control or eradication (USDA 2014).

New Mexico's Noxious Weed Management Act of 1998 directs the NMDA to develop a noxious weed list and identify methods for control or eradication of these species. Under this act, noxious weeds are defined as "a plant species that is not indigenous to New Mexico and that has been targeted pursuant to the Noxious Weed Management Act for management or control because of its negative impact on the economy or the environment." The NMDA has designated 37 species as state-listed noxious weeds to be targeted for control or eradication (NMDA 2009).

In the San Juan Basin, noxious weeds and invasive species are frequently found in areas that have been disturbed by surface activities. The BLM FFO has a list of 25 invasive and non-native plant species of concern in their planning area (BLM 2003a). For all actions on BLM FFO–managed surface that involves surface disturbance or reclamation, reasonable steps are required to prevent the introduction or spread of noxious weeds and invasive species (BLM 2003a:3–34–3–35).

Escrito D20

No USDA-listed or BLM FFO–listed species were observed within the surface disturbance areas associated with the proposed project.

One NMDA-listed Class B noxious weed (halogeton [*Halogeton glomeratus*]) was observed in the course of the biological surveys for the proposed project. Halogeton was identified at the northern terminus of the proposed well-connect pipeline corridor. This population is located within an existing pipeline ROW and is depicted on Figure 2.1 in the BSR.

Escrito E22, Escrito M21, and Nageezi 101H–103H

No USDA-, BLM FFO–, or NMDA-listed species were observed within the surface disturbance areas associated with the proposed projects. However, Russian knapweed, an NMDA Class-B listed species and BLM FFO Class-C listed species, was identified within two of the existing stock ponds to be used for construction material along the Escrito M21 and Nageezi 101H–103H access roads.

3.6.2. Impacts from Proposed Action

Direct and Indirect Impacts

Noxious weeds and invasive species are generally tolerant of disturbed conditions. The disturbed soils at the proposed project sites could provide an opportunity for the introduction and establishment of noxious weeds and invasive species. Seeds or other propagules of noxious weeds and invasive species could be transported to the proposed project sites from infested areas by equipment used at the site. Noxious weeds and invasive species could also spread from established populations near the proposed project areas and colonize soils disturbed by proposed project activities. The longer time periods required for the re-establishment of plant communities in arid regions could create an increased potential for the establishment and spread of noxious weeds and invasive species. Noxious weeds and invasive species typically develop high population densities and tend to exclude native plant species, thereby reducing species diversity and potentially resulting in long-term effects. The establishment of noxious weeds and invasive species could reduce the success of native plant community restoration efforts in the proposed project areas and create a source of future colonization and degradation of adjacent undisturbed areas.

The establishment of noxious weeds and invasive species, particularly annual grasses, such as cheatgrass (*Bromus tectorum*), which produce large amounts of easily ignitable fuel over large contiguous areas, could alter fire regimes. This situation could result in an increase in the frequency and intensity of wildfires, and in some areas, such as in some desert-scrub communities, a fire regime could be created where none was present before. In plant communities that are not adapted to frequent or intense fires, native species, particularly shrubs and trees, could be adversely affected, and their populations could be greatly reduced, creating opportunities for greater increases in noxious weeds and invasive species populations (Brooks and Pyke 2001).

In order to control/eradicate Russian knapweed within the two existing stock ponds and potential noxious weeds in the third existing stock pond to be used for the proposed Escrito M21 and Nageezi 101H–103H access roads, the stock ponds have been incorporated into Encana's weed maintenance program. Additional design features and BMPs have been developed for the proposed projects (see Section 2.2.3) to control noxious weeds and invasive species and to maximize the potential for successful reclamation.

Cumulative Impacts

The analysis area (watershed) and impact indicator (acres) for noxious weeds and invasive species is the same for cumulative impacts as for direct and indirect impacts. Impacts from past actions within the 169,788-acre analysis area (Blanco Canyon Watershed [HUC 1408010305]) include approximately 1,150 acres of surface disturbance, including past construction of 341 oil and gas well pads and associated roads and pipelines and decades of managed livestock grazing. Past actions account for surface disturbance, vegetation removal, and potential introduction/spread of noxious weeds and invasive species on approximately 0.7% of the analysis area. Reclamation of some disturbed areas and use of BMPs, such as interim reclamation, has reduced impacts to vegetation posed by the potential introduction and/or spreading of noxious weeds and invasive species.

Based on the RFD scenario (Engler et al. 2014), present and future oil and gas development in the analysis area could result in an additional 2,179 acres (1.3% of the analysis area) of additional surface disturbance and 512 acres (0.3% of the analysis area) of long-term surface disturbance within the analysis area. Present and future livestock grazing could result in additional surface disturbance within the analysis area. In addition to the impacts described above for direct and indirect impacts, impacts to vegetation and habitat posed by noxious weeds and invasive species would depend on the placement and type of surface disturbance and the plant species present within the individual project areas. Generally, native vegetation loss and the spread of noxious weeds and invasive species would be expected to occur, especially during construction of the future actions. The proposed projects would require BMPs and other mitigation to reduce these impacts. In time, the reclaimed areas would result in stable plant communities.

The Proposed Action would add approximately 41 acres of surface disturbance to the past, present, and reasonably foreseeable actions calculated above (0.7% of the Blanco Canyon Watershed [HUC 1408010305] are for noxious weeds and invasive species). Together, the cumulative surface disturbance would total 3,370 acres (2.0% of the Blanco Canyon Watershed [HUC 1408010305] for noxious weeds and invasive species) of short-term surface disturbance and 1,674 acres (1.0% of the Blanco Canyon Watershed [HUC 1408010305]) of long-term surface disturbance within the analysis area.

3.7. Wildlife

3.7.1. Affected Environment

General Wildlife

The Arizona/New Mexico Plateau – San Juan/Chaco Tablelands and Mesas ecological region (Griffith et al. 2006) provides habitat for a variety of wildlife species. The objectives of the BLM wildlife management program are to "ensure optimum populations and a natural abundance and diversity of fish and wildlife values by restoring, maintaining, and enhancing habitat conditions for consumptive and non-consumptive uses" (BLM 2003a:2–24). The significance of the general region to the Arizona/New Mexico Plateau – San Juan/Chaco Tablelands and Mesas ecological region is that it represents a metapopulation with respect to mule deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*).

No prairie dog (*Cynomys* sp.) colonies have been recorded by the BLM FFO within or adjacent to the proposed project areas (BLM 2012). No signs of prairie dogs were observed during the biological surveys.

As stated in Chapter 1 (see Section 1.6.3 [Issues Considered but Not Analyzed]) and the BSR, biological surveys of the proposed project areas were conducted in April and May 2015. SWCA biologists detected

38 bird species, six mammals, and two reptiles during the biological surveys of the proposed project areas; these species are provided in the BSR.

Migratory Birds

EO 13186, dated January 17, 2001, calls for increased efforts to more fully implement the Migratory Bird Treaty Act of 1918 (MBTA), as amended. In keeping with this mandate, the BLM FFO has issued an interim policy to minimize unintentional take, as defined by the ESA, and to better optimize migratory bird efforts related to BLM FFO activities. In keeping with this policy, a list of priority birds of conservation concern that occur in ecological regions similar to the proposed project areas was compiled through a review of existing bird conservation plans, including the following:

- USFWS Birds of Conservation Concern (provided in the BSR),
- the New Mexico Partners in Flight New Mexico Bird Conservation Plan,
- the Comprehensive Wildlife Conservation Strategy for New Mexico,
- the Gray Vireo Recovery Plan,
- the North American Waterbird Conservation Plan, and
- recovery plans and conservation plans/strategies prepared for federally listed candidate species.

The selected species have a known distribution in the BLM FFO area and may be affected by various types of perturbations. These species and an evaluation of their potential to occur within the proposed project areas is provided in Table 22.

Table 22. Migratory Birds with Potential to Occur in the Proposed Project Areas

Species Name	Potential to Occur in the Proposed Project Areas			
	Escrito D20	Escrito E22	Escrito M21	Nageezi 101H-103H
Bendire's thrasher (*Toxostoma bendirei*)	May occur	Unlikely	May occur	May occur
Black-throated sparrow (*Amphispiza bilineata*)	May occur	Unlikely	May occur	May occur
Brewer's sparrow (*Spizella breweri*)	May occur	Unlikely	May occur	May occur
Gray vireo (*Vireo vicinior*)	Unlikely	Unlikely	Unlikely	Unlikely
Loggerhead shrike (*Lanius ludovicianus*)	Known to occur	May occur	May occur	May occur
Mountain bluebird (*Sialia currucoides*)	Known to occur	May occur	May occur	Known to occur
Mourning dove (*Zenaida macroura*)	May occur	May occur	Known to occur	May occur
Sage sparrow (*Amphispiza belli*)	May occur	May occur	Known to occur	May occur
Sage thrasher (*Oreoscoptes montanus*)	May occur	Unlikely	May occur	May occur
Scaled quail (*Callipepla squamata*)	Unlikely	Unlikely	Unlikely	Unlikely
Swainson's hawk (*Buteo swainsoni*)	May occur	May occur	May occur	May occur
Vesper sparrow (*Pooecetes gramineus*)	Unlikely	Unlikely	Unlikely	Unlikely

During the biological surveys of the proposed project areas, 38 bird species were observed or heard (see BSR). Bird nests were not observed during the biological surveys of the proposed Escrito D20, Escrito E22, or Nageezi 101H–103H projects. However, one active red-tailed hawk (*Buteo jamaicensis*) nest was identified within transmission line poles approximately 0.5 mile southeast of the proposed Escrito M21 well pad (see Figure 2.2 in the BSR).

Bald and Golden Eagles

Bald and golden eagles are protected under the MBTA and the Bald and Golden Eagle Protection Act. Bald eagles are found typically in association with water, and nest and breed from October to July throughout the state. Golden eagles nest primarily on rock ledges or cliffs and occasionally in large trees at elevations ranging from 4,000 to 10,000 feet amsl. Golden eagles are typically found in mountainous regions of open country, prairies, arctic and alpine tundra, open wooded areas, and barren areas. Both bald and golden eagles are carnivores. Bald eagles prey on fish but also on mammals, especially prairie dogs. Golden eagles feed mainly on small mammals, as well as invertebrates, carrion, and other wildlife (Stahlecker and Walker 2010; Biota Information System of New Mexico 2015).

No bald or golden eagles were observed during the biological surveys of the proposed project areas. Bald eagles are unlikely to occur in the proposed project areas due to the lack of water, trees, and preferred prey. Golden eagles could potentially occur in the proposed project areas due to the presence of suitable foraging habitat.

3.7.2. Impacts from Proposed Action

Direct and Indirect Impacts

There is available, similar habitat in the region surrounding the proposed project areas that wildlife and migratory birds could utilize. However, 40.9 acres of vegetation (habitat) would be cleared during the construction phases associated with the proposed projects. Of this, 29.2 acres would be transformed to reclaimed land during interim reclamation and 11.7 acres would consist of long-term disturbance. The removal of vegetation would result in habitat loss and fragmentation for wildlife and migratory bird species. Vegetation impacts are discussed in Section 3.5 (Upland Vegetation).

If interim and final reclamation are successful, the native vegetation communities would become re-established within the proposed project areas. However, as discussed in Section 3.5 (Upland Vegetation), the re-establishment of a mature, native vegetation community could require decades (BLM 2003a:4–18). As a result, reclamation of the proposed project areas could have a long-term impact to wildlife and migratory birds by modifying habitat within and adjacent to the proposed project areas. The change in vegetative species composition could modify cover and foraging opportunities for wildlife and migratory birds.

An additional short-term direct impacts to wildlife and migratory birds could be the risk of direct mortality of species during construction, disruption or displacement of species from nesting/birthing and foraging areas, changes in activity patterns due to construction, increased human activity, increased predation due to displacement from their habitat, and other human activities such as noise disturbance. Infrequent, abrupt, and unpredictable noise could be perceived as threats and cause species to flee or hide, which could impact individual survival and fitness (Francis and Barber 2013). Habitat alterations could be considered adverse when they occur directly (through habitat loss from surface disturbance) or indirectly (through the reduction in habitat quality caused by increased noise levels and increased human activity).

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

General Wildlife

Habitat loss and fragmentation could likely reduce the carrying capacity for wildlife, although the exact level of reduction cannot be quantified (BLM 2003a: 4–26–4–27). Fragmentation would result from construction within areas that are not adjacent to existing surface disturbance. There would be approximately 7,858 linear feet (1.5 miles) of new, short-term habitat fragmentation resulting from the proposed projects. This fragmentation would exist until final reclamation is deemed successful. The

proposed well-connect pipelines, TUAs, and staging area would parallel proposed or existing disturbance; therefore, these features would not contribute to new habitat fragmentation. New short-term habitat fragmentation would result from the proposed project features described in Table 23.

Table 23. New Short-Term Habitat Fragmentation from Proposed Projects

Proposed Project	Proposed Access Road		Proposed Well Pad (along longest side; feet)	Total (feet)
	Explanation	Feet		
Escrito D20	The proposed access road would be 6,078 feet long. Of this, 4,903 feet would be associated with upgrading an existing road. Therefore, 1,175 feet would be considered new habitat fragmentation.	1,175	590	1,765
Escrito E22	The proposed access road would be 822 feet long. Of this, 690 feet overlap the proposed Escrito M21 access road. Therefore, 132 feet would be considered new habitat fragmentation.	132	560	692
Escrito M21	The proposed access road would be 7,088 feet long. Of this, 3,273 feet overlap an existing two-track road. Therefore, 3,815 feet would be considered new habitat fragmentation.	3,815	530	4,345
Nageezi 101H–103H	The proposed access road would be 496 feet long.	496	560	1,056
Total				***7,858***

Using the explanations provided in the paragraph above and Table 23, the proposed projects would result in 6,818 linear feet (1.3 miles) of new, long-term habitat fragmentation, as described in Table 24.

Table 24. New Long-Term Habitat Fragmentation from Proposed Projects

Proposed Project	Proposed Access Road (feet)	Proposed Well Pad (along longest side; feet)	Total (feet)
Escrito D20	1,175	350	1,525
Escrito E22	132	300	432
Escrito M21	3,815	250	4,065
Nageezi 101H–103H	496	300	796
Total			***6,818***

Migratory Birds

Approximately 40.9 acres of suitable nesting habitat would be impacted by the proposed projects, including the removal of trees, which are outlined below.

- Escrito D20: Approximately 180 trees (78% mature trees, 17% juvenile trees, and 5% standing-dead trees)
- Escrito E22: Approximately 400 trees (90% mature trees, 5% juvenile trees, and 5% standing-dead trees)
- Escrito M21: 325–450 trees (93% mature trees, 5% juvenile trees, and 2% standing-dead trees)
- Nageezi 101H–103H: Approximately 200 trees (90% mature trees, 5% juvenile trees, and 5% standing-dead trees)

In general, no major or long-term effects on migratory birds are anticipated from the implementation of the proposed projects. Incidental mortality or displacement of migratory bird species is possible on a local scale due to construction disturbance. However, many birds in the local area would move into adjacent

habitats in response to habitat loss. Adult migratory birds would not likely be directly harmed by the proposed projects because of their mobility and ability to avoid areas of human activity.

If feasible, vegetation removal associated with each proposed project would occur outside the migratory bird breeding season (May 15–July 31). As described in Section 2.2.3 (Proposed Project Design Features and Best Management Practices), any vegetation removal taking place within each proposed project area during the breeding season would be preceded by pre-construction nesting surveys to identify any occupied nests and establish avoidance buffers until the young have fledged. Pre-construction nesting surveys would also establish the occupancy status of potentially suitable nesting burrows detected within the proposed project areas for burrowing owls. If any active burrowing owl burrows are identified, a 150-meter avoidance radius would be established around the active nest site. No eggs, nestlings, or active nests should be directly harmed by the proposed projects between May 15 and July 31.

Bald and Golden Eagles

Bald eagles are unlikely to occur in the proposed project areas. Approximately 34.1 acres of potential golden eagle foraging habitat would be impacted by the proposed Escrito D20, Escrito M21, and Nageezi 101H–103H projects. There is no suitable nesting habitat within or adjacent to the proposed projects for golden eagles. As a result, the proposed projects are not anticipated to cause take of individual bald or golden eagles, their nests, or eggs.

Cumulative Impacts

Surface-disturbing activities affect wildlife (including migratory birds) through decreasing available forage and habitat and causing habitat alteration and fragmentation. Well pads, road, and utility line densities break the available habitat into smaller and smaller pieces, which could lead to displacement and physiological stress in wildlife species. Fragmentation results in indirect habitat loss and degradation. Wildlife species would have to expend an increased amount of energy to avoid disturbed areas or when experiencing alarm due to human presence, traffic, and associated noise.

The analysis area (watershed) and impact indicator (acres) for wildlife is the same for cumulative impacts as for direct and indirect impacts. Impacts from past actions within the 169,788-acre analysis area (Blanco Canyon Watershed [HUC 1408010305]) include approximately 1,150 acres of surface disturbance, including past construction of 341 oil and gas well pads and associated roads and pipelines. Past actions account for surface disturbance and habitat removal on approximately 0.7% of the analysis area. Reclamation of some disturbed areas and use of BMPs, such as interim reclamation, has reduced impacts to habitat.

Based on the RFD scenario (Engler et al. 2014), present and future oil and gas development in the analysis area could result in an additional 2,179 acres (1.3% of the analysis area) of additional surface disturbance and 512 acres (0.3% of the analysis area) of long-term surface disturbance within the analysis area. In addition to the impacts described above for direct and indirect impacts, impacts to wildlife would depend on the placement and type of surface disturbance and available habitat within and surrounding the individual project areas. Generally, native vegetation loss, increased noise, and habitat degradation would be expected to occur, especially during construction of the future actions. The subject projects would require BMPs and other mitigation to reduce these impacts. In time, the reclaimed areas would result in stable plant communities with densities that are similar to the pre-disturbance plant densities (i.e., habitat). It is likely that some species would also adapt to noise associated with maintenance and operation of these actions.

The Proposed Action would add approximately 41 acres of surface disturbance to the past, present, and reasonably foreseeable actions calculated above (0.7 % of the Blanco Canyon Watershed [HUC 1408010305] for wildlife). Together, the cumulative surface disturbance would total 3,370 acres (2.0% of the Blanco Canyon Watershed [HUC 1408010305] for wildlife) of short-term surface disturbance and 1,674 acres (1.0% of the Blanco Canyon Watershed [HUC 1408010305]) of long-term surface disturbance within the analysis area.

3.8. Special Status Species

3.8.1. Affected Environment

The BLM manages certain species which are not federally listed as threatened or endangered under the ESA in order to prevent or reduce the need to list these species under the ESA in the future. BLM special status species include BLM sensitive species and BLM FFO special management species. The New Mexico BLM State Directors have developed a list of BLM sensitive species for the State of New Mexico (BLM 2011c). In accordance with BLM Manual 6840, the BLM FFO has prepared a list of special management species to focus species management efforts toward for maintaining habitats under a multiple-use mandate (BLM 2008b). BLM FFO special management species include some BLM sensitive species and other species for which the BLM FFO has determined special management is appropriate (BLM 2008b). The authority for this policy and guidance is established by the ESA, Title II of the Sikes Act, as amended (16 USC 670a–670o, 74 statute 1052), FLPMA, and Department of Interior Manual 235.1.1A.

As stated in Chapter 1 (see Section 1.6.3 [Issues Considered but Not Analyzed]) and the BSR, biological surveys of the proposed project areas were conducted in April and May 2015. The biological surveys included an evaluation of the potential for special status species to occur within the proposed project areas. Based on current distribution, habitat requirements and biological survey results, seven BLM special status species are known or have the potential to occur within the proposed project areas. These species and their habitat requirements are discussed in detail in the BSR. The special status species that are known to occur or have the potential to occur in the proposed project areas are listed below.

- Aztec gilia: The proposed projects are located within the BLM FFO–designated habitat zone (BLM 2013b) for this species. Therefore, this species has the potential to occur in all four proposed project areas. No individuals were identified within the proposed project areas during the biological surveys.
- Bendire's thrasher: There is potential foraging and nesting habitat within the proposed Escrito D20, Escrito M21, and Nageezi 101H–103H project areas. No individuals were identified within the proposed project areas during the biological surveys.
- Brack's fishhook cactus: The proposed projects are located within the BLM FFO–designated habitat zone (BLM 2013b) for this species.
  - This species is known to occur in the proposed Escrito D20 and Escrito M21 project areas. In all, 111 Brack's fishhook cacti were identified within and adjacent to the proposed Escrito D20 project area and 11 were identified within and adjacent to the proposed Escrito M21 project area. However, in total 25 were identified within the proposed surface disturbance areas (22 within the proposed Escrito D20 surface disturbance areas and 3 within the proposed Escrito M21 surface disturbance areas). These populations are depicted on Figure 2.1 in the BSR.
  - This species has the potential to occur in the proposed Escrito E22 and Nageezi 101H–103H project areas. No individuals were identified within these two proposed project areas during the biological surveys.
- Ferruginous hawk: There is potential foraging habitat within the proposed project areas. No individuals were identified within the proposed project areas during the biological surveys.
- Golden eagle: There is potential foraging habitat within the proposed Escrito D20, Escrito M21, and Nageezi 101H–103H project areas. No individuals were identified within the proposed project areas during the biological surveys.
- Loggerhead shrike: There is potential foraging and nesting habitat within the proposed project areas. This species was identified within the proposed Escrito D20 project area during the May 2015 biological survey. This species was not identified within the proposed Escrito D20, Escrito M21, and Nageezi 101H–103H project areas during the biological surveys.
- Pinyon jay: There is potential foraging and nesting habitat within the proposed project areas. This species was identified within the proposed Escrito D20, Escrito M21, and Nageezi 101H–103H project areas during the biological surveys. This species was not identified within the proposed Escrito E22 project areas during the biological surveys.

3.8.2. Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Direct and indirect impacts for Aztec gilia, Bendire's thrasher, Brack's fishhook cactus, ferruginous hawk, golden eagle, loggerhead shrike, and pinyon jay are described below.

Aztec gilia

The proposed projects would result in the disturbance of up to 40.9 acres of habitat for Aztec gilia. Of the 40.9 acres, 11.7 acres of habitat would remain disturbed throughout the life of the proposed projects and 29.2 acres of habitat would be reclaimed during interim reclamation.

Since no individuals were identified within the proposed project areas during biological surveys, the proposed projects would not likely impact individuals.

Brack's fishhook cactus

The proposed projects would result in the disturbance of up to 40.9 acres of habitat for Brack's fishhook cactus. Of the 40.9 acres, 11.7 acres of habitat would remain disturbed throughout the life of the proposed projects and 29.2 acres of habitat would be reclaimed during interim reclamation.

Since no individuals were identified within the proposed Escrito E22 and Nageezi 101H–103H project areas during the biological surveys, these two proposed projects would not likely impact individual Brack's fishhook cactus.

During the biological surveys, 25 total Brack's fishhook cacti were identified within the proposed project surface disturbance areas (22 within the proposed Escrito D20 surface disturbance areas and 3 within the proposed Escrito M21 surface disturbance areas). Due to 25 cacti being located within the proposed surface disturbance areas and the potential effects of fugitive dust on adjacent cacti (discussed below), relocating and transplanting of Brack's fishhook cacti would be required for the Proposed Action. Additionally, operators would be responsible for monitoring the transplanted cacti for 3 years. The BLM FFO will provide Encana with guidance on the number of cacti to be transplanted and monitoring requirements prior to construction.

Following reclamation activities, Brack's fishhook cacti could become re-established within the reclaimed areas, although the likelihood of reestablishment is unlikely. During final reclamation, Encana would reclaim all portions of the proposed projects that were not fully reclaimed during interim reclamation. This would include clearing the vegetation from within the areas that were only reseeded and not recontoured during interim reclamation. If any Brack's fishhook cactus became re-established within this reclaimed area, species could be killed during the clearing and recontouring phases of final reclamation.

Indirectly, the deposition of fugitive dust generated during vegetation-clearing activities, during the use of the proposed well pads and access roads, and during wind events could reduce photosynthesis and productivity of the surrounding vegetation (Hirano et al. 1995; Thompson et al. 1984). The deposition of fugitive dust could also increase water loss in plants near the proposed project areas (Eveling and Bataille 1984). Plant community composition surrounding the proposed project areas could subsequently be altered, resulting in habitat degradation, which could affect Brack's fishhook cacti growing in the vicinity of the proposed project areas. BMPs to control fugitive dust are incorporated into the project design features found in Section 2.2.3.

Bendire's Thrasher and Loggerhead Shrike

In addition to the direct and indirect impacts described for wildlife in Section 3.7, suitable nesting habitat for Bendire's thrashers and loggerhead shrikes is present within the Escrito D20, Escrito M21, and Nageezi 101H–103H project areas. These three proposed projects would result in the disturbance of up to 34.1 acres of nesting habitat. Of the 34.1 acres, 9.5 acres of habitat would remain disturbed throughout

the life of the proposed projects and 24.6 acres of habitat would be reclaimed during interim reclamation. In addition, trees would be removed within these three proposed project areas, as outlined below.

- Escrito D20: Approximately 180 trees (78% mature trees, 17% juvenile trees, and 5% standing-dead trees)
- Escrito M21: 325–450 trees (93% mature trees, 5% juvenile trees, and 2% standing-dead trees)
- Nageezi 101H–103H: Approximately 200 trees (90% mature trees, 5% juvenile trees, and 5% standing-dead trees)

As described in Section 2.2.3 (Proposed Project Design Features and Best Management Practices), any vegetation removal taking place within each of the proposed project areas during the breeding season would be preceded by pre-construction nesting surveys to identify any occupied nests and establish avoidance buffers until the young have fledged. No eggs, nestlings, or active nests should be directly harmed by the proposed projects between May 15 and July 31.

Pinyon Jay

In addition to the direct and indirect impacts described for wildlife in Section 3.7, suitable nesting habitat for pinyon jays is present within all four proposed project areas. The proposed projects would result in the disturbance of up to 40.9 acres of pinyon jay nesting habitat. Of the 40.9 acres, 11.7 acres of habitat would remain disturbed throughout the life of the proposed projects and 29.2 acres of habitat would be reclaimed during interim reclamation. In addition, trees would be removed within the proposed project areas, as outlined below.

- Escrito D20: Approximately 180 trees (78% mature trees, 17% juvenile trees, and 5% standing-dead trees)
- Escrito E22: Approximately 400 trees (90% mature trees, 5% juvenile trees, and 5% standing-dead trees)
- Escrito M21: 325–450 trees (93% mature trees, 5% juvenile trees, and 2% standing-dead trees)
- Nageezi 101H–103H: Approximately 200 trees (90% mature trees, 5% juvenile trees, and 5% standing-dead trees)

As described in Section 2.2.3 (Proposed Project Design Features and Best Management Practices), any vegetation removal taking place within each proposed project area during the breeding season would be preceded by pre-construction nesting surveys to identify any occupied nests and establish avoidance buffers until the young have fledged. No eggs, nestlings, or active nests should be directly harmed by the proposed projects between May 15 and July 31.

Ferruginous Hawk

In addition to the direct and indirect impacts described for wildlife in Section 3.7, there is potential foraging habitat within all four proposed project areas for ferruginous hawks. The proposed projects would result in the disturbance of up to 40.9 acres of ferruginous hawk foraging habitat. Of the 40.9 acres, 11.7 acres of habitat would remain disturbed throughout the life of the proposed projects and 29.2 acres of habitat would be reclaimed during interim reclamation.

Due to the mobility of adult birds, it is unlikely that ferruginous hawks would be directly harmed by the Proposed Action.

Golden Eagle

In addition to the direct and indirect impacts described for wildlife in Section 3.7, there is potential foraging habitat the proposed Escrito D20, Escrito M21, and Nageezi 101H–103H project areas for golden eagles. These three proposed projects would result in the disturbance of up to 34.1 acres of golden eagle foraging habitat. Of the 34.1 acres, 9.5 acres of habitat would remain disturbed throughout the life of the proposed projects and 24.6 acres of habitat would be reclaimed during interim reclamation.

Due to the mobility of adult birds, it is unlikely that golden eagles would be directly harmed by the Proposed Action.

Cumulative Impacts

Surface-disturbing activities could affect special status species through decreasing available forage and habitat and causing habitat alteration and fragmentation. Well pads, road, and utility line densities break the available habitat into smaller and smaller pieces, which could lead to displacement and physiological stress on special status species. Fragmentation results in indirect habitat loss and degradation. Special status wildlife species would have to expend an increased amount of energy to avoid disturbed areas or when experiencing alarm due to human presence, traffic, and associated noise.

The analysis area (watershed) and impact indicator (acres) for special status species is the same for cumulative impacts as for direct and indirect impacts. Impacts from past actions within the 169,788-acre analysis area (Blanco Canyon Watershed [HUC 1408010305]) include approximately 1,150 acres of surface disturbance, including past construction of 341 oil and gas well pads and associated roads and pipelines. Past actions account for surface disturbance and habitat removal on approximately 0.7% of the analysis area. Reclamation of some disturbed areas and use of BMPs, such as interim reclamation, has reduced impacts to habitat.

Based on the RFD scenario (Engler et al. 2014), present and future oil and gas development in the analysis area could result in an additional 2,179 acres (1.3% of the analysis area) of additional surface disturbance and 512 acres (0.3% of the analysis area) of long-term surface disturbance within the analysis area. In addition to the impacts described above for direct and indirect impacts, impacts to special status species would depend on the placement and type of surface disturbance and available habitat within and surrounding the individual project areas. Generally, native vegetation loss, increased noise, and habitat degradation would be expected to occur, especially during construction of the future actions. The subject projects would require BMPs and other mitigation to reduce these impacts. In time, the reclaimed areas would result in stable plant communities with densities that are similar to the pre-disturbance plant densities (i.e., habitat). It is likely that some species would also adapt to noise associated with maintenance and operation of these actions.

The Proposed Action would add approximately 41 acres of surface disturbance to the past, present, and reasonably foreseeable actions calculated above (0.7 % of the Blanco Canyon Watershed [HUC 1408010305] for special status species). Together, the cumulative surface disturbance would total 3,370 acres (2.0% of the Blanco Canyon Watershed [HUC 1408010305] for special status species) of short-term surface disturbance and 1,674 acres (1.0% of the Blanco Canyon Watershed [HUC 1408010305]) of long-term surface disturbance within the analysis area.

3.9. Cultural Resources

3.9.1. Affected Environment

The proposed projects are located within the archaeologically rich San Juan Basin of northwest New Mexico. In general, the history of the San Juan Basin can be divided into five major periods: Paleoindian (ca. 10,000 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 descriptions of these various periods are provided in the *PRMP/FEIS* (BLM 2003b) and will not be reiterated here. Additional information can also be found in an associated document, the Cultural Resources Technical Report (Science Applications International Corporation 2002).

BLM Manual 8100, The Foundations for Managing Cultural Resources (2004b) defines a cultural resource as "*a definite location of human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups. (cf. "traditional cultural property"). Cultural resources are concrete, material places and things that are located, classified, ranked, and managed through the system of identifying, protecting, and utilizing*

for public benefit described in this Manual series. They may be but are not necessarily eligible for the National Register (a.k.a. "historic property")."

In the broadest sense cultural resources include sites, buildings, structures, objects, and districts/landscapes (National Park Service 1997). Cultural resources (prehistoric or historic) 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. TCPs are cultural resources that are eligible for the NRHP and have cultural values, sometimes sacred, 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 (Parker and King 1998). Historically Native American communities are most likely to identify TCPs, although TCPs are not restricted to those associations. Some TCPs are well known while others may only be known to a small group or otherwise only vaguely known. Native American tribal perspectives on what is considered a TCP are not necessarily limited by a places National Register eligibility or lack thereof.

The NRHP (36 CFR 60) is the basic benchmark by which the significance of cultural resources are evaluated by a federal agency when considering what effects its actions may have on those resources. To summarize, to be considered eligible for the NRHP a cultural resource must meet one or more of the following criteria: a) are associated with events that have significantly contributed to the broad patterns of our history; or b) are associated with the lives of persons significant in our past; or c) embody distinctive characteristics of the type, period, or method of construction, or represents the work of a master, or possesses high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; or d) have yielded, or may be likely to yield, information that is important in a pre-history or history. The resource, as applicable, must possess one or more of the following aspects of integrity; location, design, setting, materials, workmanship, feeling, and association. In the event a determination of eligibility cannot be made, the resource is treated as eligible (a historic property).

Section 106 of the NHPA and its implementing regulations (36 CFR 800) requires federal agencies to consider what effect their licensing, permitting, funding or otherwise authorizing an undertaking, such as an APD or ROW grant, may have on properties eligible for the National Register. Pursuant to 36 CFR 800.16(i), "Effect means alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register." Effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative. Area of Potential Effect (APE) means the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is typically defined as areas to be directly disturbed and areas in immediate close proximity. Cultural resources are identified and reported through a combination of literature review and pedestrian survey consistent with guidelines set forth in the Procedures for Performing Cultural Resources Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities (BLM 2005).

BLM FFO compliance with Section 106 is adhered to by following the State Protocol Agreement between New Mexico BLM and New Mexico State Historic Preservation Officer (BLM-SHPO 2014), which is authorized by the NPA among the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers (NPA 2012), and other applicable BLM handbooks.

Cultural resources within the entire APE for the Proposed Action were identified by a literature review and an archaeological BLM Class III level (100%) pedestrian survey by LAC and reports were prepared and submitted to the BLM.

For the Proposed Action, identification of 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 reports 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.

Escrito D20

The Class III inventory identified three cultural sites within the APE (LAC Report 2014-2fff [LAC 2015a]; BLM Report 2015(IV)012F). One of the sites is recommended eligible for nomination to the NRHP and three of the sites are recommended not eligible for nomination to the NRHP.

Escrito E22

The Class III inventory identified one cultural site within the APE (LAC Report 2014-2gg [LAC 2015b]; BLM Report 2015(IV)011F). This site is recommended not eligible for nomination to the NRHP.

Escrito M21

The Class III inventory identified four cultural sites within the APE (LAC Report 2014-2dd [LAC 2015c]; BLM Report 2015(IV)001F). Two of the sites are of undetermined eligibility for nomination to the NRHP and two of the sites are recommended not eligible for nomination to the NRHP.

Nageezi 101H–103H

The Class III inventory identified two cultural sites within the APE (LAC Report 2014-2hh [LAC 2015d]; BLM Report 2015(IV)002F). These sites are recommended not eligible for nomination to the NRHP.

3.9.2. Impacts from Proposed Action

Direct and Indirect Impacts

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

Significant cultural sites (e.g., NRHP 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 COAs in the APDs and stipulations attached to the ROW grants. 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 historic properties (no historic properties affected).

Cumulative Impacts

The Cumulative Impacts Analysis Area (CIAA) is the associated watershed(s).The United States is divided and sub-divided into successively smaller hydrologic units which are classified into six levels nested within each other, from the largest geographic area (region) to the smallest geographic area (subwatershed). The boundaries are distinguished by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream or similar surface waters (USGS 2013, NRCS 2013). Hydrologic units can be viewed as a naturally defined landscape and impacts to cultural resources in one part of that landscape could, theoretically, affect a broader understanding of the interrelationships between sites in the landscape as a whole. The smallest hydrologic unit area, typically from 10,000 to 40,000 acres (15 to 62 mi^2; HUC 12) or combination thereof are used as the CIAA.

The CIAA for cultural resources is the proposed project area and the Crow Canyon-Blanco Wash and Selph Canyon-Blanco Wash subwatersheds. There are no properties listed on the NRHP, New Mexico State Register of Cultural Properties, Chaco Protection Sites, World Heritage Sites, or National Historic Trails within the CIAA.

The Crow Canyon-Blanco Wash totals 38,690 acres. Based on New Mexico Cultural Resource Information System (NMCRIS) data (NMCRIS 2015), within the subwatershed there are 420 recorded sites and approximately 17% of the subwatershed (6,519 acres) has been inventoried for cultural resources by 393 unique investigations since 1974. The Selph Canyon-Blanco Wash watershed totals 38,527 acres. Based on NMCRIS data there are 166 recorded sites and approximately 9% of the subwatershed (3,573 acres) has been inventoried for cultural resources by 220 unique investigations since 1975. These inventories are likely higher as not all survey data is digitally available (e.g., Navajo lands, surveys since July 2015).

- What impacts would surface disturbance for the proposed action have on historic properties in the CIAA?

There will be no negative cumulative impact on known historic properties as they are being avoided by relocating the surface disturbing components of the proposed action away from the property. There will be no known negative cumulative impact on the landscape from the proposed action that would affect the seven aspects of integrity (location, design, setting, materials, workmanship, feeling, association) of known historic properties. A positive cumulative effect is the additional scientific information yielded by the archaeological survey both in terms of site specific information and the amount of the landscape inventoried for cultural resources.

- What impacts would the project have on unknown (buried, not visible) historic properties in the CIAA?

Risks of impacting unknown (i.e., buried) historic properties is normally negligible as cultural resources "discoveries" during surface disturbing components of a proposed action are infrequent in the BLM FFO. Since FY2000, 28 discoveries have occurred in association with 21,290 actions (e.g. road, well, pipeline, etc.), or 1:760. During that period 153,626 acres of land were inspected for cultural resources, with an average of 7.2 ac per action and one discovery per 5,472 acres per discovery. All authorizations (e.g., APDs, ROWs) have stipulations, under penalty of law, requiring the reporting of and avoidance of further disturbing cultural discoveries during a proposed action. Where the risk of discoveries can be reasonably expected (e.g., ≤ 100 feet of a known historic property, or in environmental settings known or suspected to be conducive to buried sites), archaeological monitoring by a qualified and permitted archaeologist during initial disturbance (e.g., blading, trenching) is normally required. If buried historic properties are discovered, collaborative steps are taken to protect them in place or recover their important information.

3.10. Livestock Grazing

3.10.1. Affected Environment

The proposed projects are located in the Highway 57 Allotment (Allotment No. 27658). Vegetation in the allotment is predominately in the sagebrush shrubland and piñon-juniper woodland vegetation communities. The Highway 57 Allotment has a grazing authorization permitting 246 cattle with a year-round grazing period. The term grazing authorization permits the utilization of 2,155 active AUMs of forage. An AUM is the amount of forage needed to sustain a cow (1,000 pound) or cow/calf pair for one month. The allotment is 29,798 acres and consists of 73% BLM-authorized AUMs. The average rangeland carrying capacity for the allotment is 13.8 acres per AUM.

As stated in Chapter 2, three existing stock ponds, all located on BLM FFO–managed surface, would be cleaned out as part of the proposed Escrito M21 and Nageezi 101H–103H projects. These stock ponds are depicted on Figure 1 in Chapter 1.

3.10.2. Impacts from Proposed Action

Direct and Indirect Impacts

Forage removal within the Highway 57 Allotment would be the primary impact to livestock grazing resources. The proposed projects would result in new surface disturbance of 40.9 acres within the allotment, of which 29.2 acres would be short-term disturbance and 11.7 acres would be long-term disturbance. The estimated short-term impact to range carrying capacity would be a loss of 3.0 AUMs (assuming 13.8 acres per AUM and short-term disturbance of 40.9 acres). After successful interim reclamation, the long-term impact would be 0.8 AUMs (assuming 13.8 acres per AUM and long-term disturbance of 11.7 acres).

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

Direct impacts to livestock could occur if holes or ditches are not excluded properly. Any type of hole or ditch is potentially a hazard to livestock while grazing. Cow or calf injuries could occur when they fall into or try to get out of a ditch-type cavity. Cow or calf leg injuries could also occur if a small hole is left uncovered. Livestock could step into the hole and break a leg. The design features for the proposed projects (see Section 2.2.3) identify measures to prevent these types of impacts.

A positive impact to livestock grazing could result from Encana cleaning out the three existing stock ponds depicted on Figure 1. The flow of water to these ponds should not be affected by construction of the proposed access roads. As stated in Section 2.2.3, culverts would be placed beneath the proposed access roads to allow water to flow downstream of the proposed access roads and into any existing stock ponds located downstream of the proposed access roads.

Cumulative Impacts

The analysis area (watershed) and impact indicator (acres) for livestock grazing is the same for cumulative impacts as for direct and indirect impacts. Impacts from past actions within the 29,798-acre analysis area (Highway 57 Allotment [27658]) include approximately 182 acres surface disturbance, including past construction of oil and gas well pads and associated roads and pipelines. Past actions account for surface disturbance and vegetation removal on approximately 0.6% of the analysis area. The loss of vegetation would result in a loss of forage available to livestock within the analysis area. Reclamation of some disturbed areas and use of BMPs, such as reclamation, has reduced impacts to vegetation and livestock grazing conditions.

Based on the RFD scenario (Engler et al. 2014), present and future oil and gas development in the analysis area could result in an additional 438 acres (1.5% of the analysis area) of additional surface disturbance and 104 acres (0.4% of the analysis area) of long-term surface disturbance within the analysis area. In addition to the impacts described above for direct and indirect impacts, impacts to vegetation and livestock grazing conditions would depend on the placement and type of surface disturbance and the plant species present within the individual project areas. Generally, native vegetation loss and potential spread of noxious weeds and invasive species would be expected to occur, especially during construction of future actions. The proposed projects would require BMPs and other mitigation to reduce these impacts. In time, the reclaimed areas would result in stable plant communities with densities that are similar to the pre-disturbance plant densities; thereby, reclaiming the forage available to livestock.

The Proposed Action would add approximately 41 acres of surface disturbance to the past, present, and reasonably foreseeable actions calculated above (0.1% of Allotment No. 27658 for livestock grazing). Together, the cumulative surface disturbance would total 661 acres (2.2% of Allotment No. 27658 for livestock grazing) of short-term surface disturbance and 298 acres (1.0% of Allotment No. 27658) of long-term surface disturbance within the analysis area.

3.11. Social and Economic Features / Environmental Justice

3.11.1. Affected Environment

Social and Economic Features

The proposed projects are located in San Juan County, New Mexico. According to the 2013 U.S. Census estimate, New Mexico had a population of 2,085,287 with 126,503 persons residing in San Juan County (down from 128,200 persons in 2012) (U.S. Census Bureau 2014a). San Juan County, considered rural in character, is approximately 5,514 square miles in area (not including rivers and lakes), with an average of 23.6 persons per square mile (based on 2010 census data). Only 6% of the land in the county is privately owned.

From 2008 to 2012, San Juan County had a median household income of $48,701 and a per capita personal income of $21,561 (in 2012 inflation-adjusted dollars). This 2012 figure was 76.9% of the national average per capita income, which was $28,051 and 90.8% of the average per capita income for New Mexico, which was $23,749 (U.S. Census Bureau 2013a).

San Juan County is an integral part of the greater Four Corners region. Each community in this region is economically integrated with its surrounding communities. The nearest town to the proposed projects with census data is Bloomfield, New Mexico (approximately 30 miles away), which had an estimated population of 7,801 in 2013 (U.S. Census Bureau 2013a). According to U.S. Census data, the average per capita income for Bloomfield from 2008 to 2012 was $17,685 (in 2012 inflation-adjusted dollars).

Environmental Justice

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

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

Guidance on environmental justice terminology developed by the President's CEQ (1997) is discussed below.

- Low-income population: This population is determined based on annual statistical poverty thresholds developed by the U.S. Census Bureau. In 2012, poverty level is based on total income of $11,720 for an individual and $23,283 for a family of four (U.S. Census Bureau 2012). A low-income community may include either a group of individuals living in geographic proximity to one another or dispersed individuals, such as migrant workers or Native Americans.
- Minority: This population includes individuals who are members of the following population groups: American Indian, Alaskan Native, Asian, Pacific Islander, Black, or Hispanic.
- Minority population area: A minority population area is so defined if either the aggregate population of all minority groups combined exceeds 50% of the total population in the area or if the percentage of the population in the area comprising all minority groups is meaningfully greater than the minority population percentage in the broader region. Like a low-income population, a minority population may include either individuals living in geographic proximity to one another or dispersed individuals.
- Comparison population: For the purpose of identifying a minority population or a low-income population concentration, the comparison population used in this study is the State of New Mexico as a whole

Low-income Populations

Income and poverty data estimates for study area counties from the U.S. Census Small Area Income and Poverty Estimates (SAIPE) model indicate that the percent of the population living below the poverty level in the socioeconomic study area as a whole is slightly above that of the state (21.3% and 20.6%), but it is much higher than the national average of 12.1% (Table 25). Poverty levels ranged from 37.7% in McKinley County to 13.7% in San Juan County. Only that of Sandoval County was below the state average.

Table 25. Study Area County Population in Poverty (2002–2012)

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

Source: U.S. Census Bureau 2013b

Similarly, estimates from 2012 indicate that Sandoval and San Juan Counties had household median incomes ($57,376 and $45,901) that were above the state level of $42,828. McKinley County ($29,821) and Rio Arriba County ($36,900) were below that of the state in 2012 (Table 26). While no area communities meet the CEQ definition of a low-income population area (50% or higher), the highest poverty rates were seen in Bloomfield (29.0%), Española (26.3%), and Bernalillo (24.1%).

Table 26. Study Area Key Community Race/Ethnicity and Poverty Data

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

Source: U.S. Census Bureau 2013a
Note: American Community Survey estimates are based on data collected over a 5-year time period. The estimates represent the average characteristics of populations between January 2008 and December 2012 and do not represent a single point in time.

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

When broken down by Census Tract, three out of 87 tracts in the socioeconomic study area have greater than 50% of individuals living below the poverty line: Census Track 9440 in eastern McKinley County had

an individual poverty rate of 54.6%, Census Tract 9405 in southwestern McKinley County had an individual poverty rate of 59.4%, and Census Tract 9409 in northwestern Sandoval County had an individual poverty rate of 51.9% (U.S. Census Bureau 2013a). These three Census Tracts are all relatively large, indicating a sparsely populated, rural area. The proposed projects are in Census Tract 9432.01, a tract that covers a large rural area that is more sparsely populated than the nearby urban areas of Farmington, Kirtland, and Bloomfield. Additionally, this census tract contains many discontinuous parcels of Navajo Nation off-reservation trust lands (U.S. Census Bureau 2014b). Income data for this tract was not available via the U.S. Census Bureau.

The Proposed Action is primarily located within an area of developed and undeveloped rural land in southeastern San Juan County. The proposed projects are located approximately 3 miles northwest of Nageezi, a census-designated place along U.S. Highway 550. In 2012, the individual poverty rate was 33.4% for a population of 298, substantially higher than the San Juan County average at 20.3%. Additionally, the proposed projects are located 25 miles northeast of the census-designated place of Lake Valley, near State Highway 371. In 2012, the poverty rate was 26.0% for a population of 84, higher than the county rate (U.S. Census Bureau 2013a), These low-income populations, while higher in percentage than the county average, would not be considered an environmental justice community as the percentage does not exceed 50%. The proposed projects are not located within an area community that meets the CEQ definition of a low-income population area (more than 50% low income) (see Table 26).

Minority Populations

Based on 2008–2012 data, minorities made up 59.5% of the population in New Mexico, compared to 36.3% in the United States as a whole (Table 27). The proportion of minorities in the socioeconomic study area (65.3%) substantially exceeded the United States and is slightly higher than the state average. At the county level, the population ranged from 89.7% minority in McKinley County to 52.8% in Sandoval County. Within relevant tribal nations, Native Americans represented the vast majority of the population. The largest minority groups were Hispanics/Latinos in Rio Arriba and Sandoval Counties and Native Americans in McKinley and San Juan Counties.

Table 27. Study Area County Population by Race/Ethnicity (2008–2012)

Population	McKinley County	Rio Arriba County	Sandoval	San Juan	Study Area	New Mexico	United States	Jicarilla Apache Nation	Navaho Nation	Ute Mountain Nation
Hispanic or Latino ethnicity of any race	9,744	28,714	46,334	24,496	109,288	952,569	50,545,275	382	2,958	99
	13.6%	71.4%	35.3%	19%	29%	46.3%	16.4%	11.6%	1.7%	6.0%
White alone	7,413	5,370	61,977	54,218	128,978	831,543	196,903,968	74	3,762	47
	10.3%	28.6%	47.2%	42.2%	34.67%	40.5%	63.7%	2.3%	2.2%	2.9%
Black or African American alone	353	149	2,704	794	4000	35,586	37,786,591	0	250	5
	0.5%	0.4%	2.1%	0.6%	1.08%	1.7%	12.2%	0%	0.1%	0.3%
American Indian or Alaskan Native alone	52,358	5,629	15,964	46,676	120,627	176,766	2,050,766	2,692	162,920	1,429
	72.8%	14.0%	12.2%	36.3%	32.43%	8.6%	0.7%	82.0%	94.3%	87.0%
Asian alone	506	173	1,685	464	2828	25,411	14,692,794	73	834	14
	0.7%	0.4%	1.3%	0.4%	0.76%	1.2%	4.8%	2.2%	0.5%	0.9%
Native	38	7	100	72	217	989	480,063	0	209	0

Population	McKinley County	Rio Arriba County	Sandoval	San Juan	Study Area	New Mexico	United States	Jicarilla Apache Nation	Navaho Nation	Ute Mountain Nation
Hawaiian and other Pacific Islander alone	0.1%	0%	0.1%	0.1%	0.06%	<.01%	0.2%	0%	0.1%	0%
Some other race	7	22	437	84	550	3,623	616,191	0	102	0
	<.01%	0.1%	0.3%	0.1%	0.15%	0.2%	0.2%	0%	0.1%	0%
Two or more races	1,469	137	2,101	1,796	5,503	28,800	6,063,063	62	1,660	49
	2.0%	0.3%	1.6%	1.4%	1.48%	1.4%	2.0%	1.9%	1.0%	3.0%
Classified as minority population based on CEQ guidelines?	Yes	Yes	Yes	Yes		Yes	NA	Yes	Yes	Yes

Source: U.S. Census Bureau 2013a
Note: American Community Survey estimates are based on data collected over a 5-year time period. The estimates represent the average characteristics of populations between January 2008 and December 2012 and do not represent a single point in time

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

When examined at the Census Tract level, there are 24 out of 87 tracts that have a minority population greater than 50%. These range from Census Tract 6.1 located just north of the city of Aztec with a minority population of 80.5% to Census Tract 107.17 located north of the city of Rio Rancho with a minority population of 50.2% (U.S. Census Bureau 2013a). These Census Tracts are relatively small and are based around the city of Rio Rancho and the Aztec/Farmington/Bloomfield area.

Native American Populations

Data in Table 27 account for a substantial portion of the study area population in some areas, notably McKinley and San Juan Counties, where the population is 72.8% and 36.3% American Indian, respectively. Three tribal governments have reservations within the planning area: the Jicarilla Apache Nation, the Navajo Nation, and the Ute Mountain Nation (Table 28). The Southern Ute Nation has lands just north of the BLM FFO planning area in the state of Colorado, but none within the planning area. Almost one half of the planning area is tribal lands. Each tribe maintains a general concern for protection of and access to areas of traditional and religious importance, and the welfare of plants, animals, air, landforms, and water on reservation and public lands. Policies established in 2006 by the BLM and USFS, in coordination with federal tribes, ensure access by traditional native practitioners to area plants. The policy also ensures that management of these plants promotes ecosystem health for public lands. The BLM is encouraged to support and incorporate into their planning traditional native and native practitioner plant-gathering for traditional use (Boshell 2010).

Table 28. Tribal Nations in the Planning Area

Tribe	Acres in Planning Area	General Location
Jicarilla Apache Nation	739,600	The majority of the Jicarilla Apache Nation is located in western Rio Arriba County, but within the eastern portion of the planning area
Navajo Nation	860,900	A portion of the Navajo Nation extends into western San Juan County and into the western portion of the planning area

Tribe	Acres in Planning Area	General Location
Ute Mountain Nation	103,500	A portion of the Ute Mountain Nation extends into the northern portion of San Juan County, just east of the Navajo Nation, and into the northern portion of the planning area
Unknown	196,300	Lands located in the southern portion of the planning area

Source: BLM 2014b, U.S. Census Bureau 2014b

The Proposed Action is located in an area characterized by discontinuous parcels of off-reservation trust lands allotted to the Navajo Nation. The nearby census-designated place of Nageezi had a population of 298 in 2012, with 92.3% of the population being American Indian or Alaska Native. Likewise, Lake Valley reported that 100% of the population (84 persons) were American Indian or Alaska Native (U.S. Census Bureau 2013a).

Overall, Census Tract 9432.01 is considered to have a minority population greater than 50%, with 70.2% of its population identifying as American Indian or Alaskan Native (U.S. Census Bureau 2013a). Therefore, the Proposed Action is in a minority community as defined by CEQ and, based on these factors, is within an area that meets the demographic criteria under EO 12898. Additionally, there are 6 residences located in an inholding of Navajo Nation allotted land approximately 1 mile (at the closest point) southeast of Nageezi 101H–103H. Being on tribal lands, the residents are likely members of the Navajo Nation.

3.11.2. Impacts from Proposed Action

Direct and Indirect Impacts

Social and Economic Features

This analysis does not focus on all aspects of economics within the proposed project areas. Only the projected economic effects of the Proposed Action and economic statistics at the state, county, and local levels are considered to describe the economic context of the Proposed Action.

The proposed projects are located within an existing oil and gas development area within an unincorporated area of San Juan County. It is expected that approval of the Proposed Action would bring some economic multipliers to the towns en route to the proposed project areas. Construction and operation of the proposed wells would benefit the residents and local business owners by providing beneficial short- and long-term impacts, both directly and indirectly. During the course of the construction phases of the proposed projects, a portion of project wages would find their way into the local economy, as construction crews would likely patronize local businesses for supplies such as fuel, food, and other necessities.

Long term, the operation of the proposed wells would provide social and economic benefits in the form of the production of natural gas and oil used for heating and other energy needs at the local, state, and regional level in the greater southwestern United States. In 2012, the oil and gas industry operating on BLM-managed lands within New Mexico had a direct economic output of $9.1 billion (BLM 2014b). The Proposed Action would contribute to this sector of the energy industry over the coming years. The Proposed Action could also provide economic benefits for state and county governments from royalty payments and severance taxes.

Environmental Justice

The minority status of the community nearest to the proposed projects qualifies it as an environmental justice population. This population, including the 6 residences located approximately 1 mile southeast of the Proposed Action would not be directly affected by the proposed projects because they are at least 1 mile away from the nearest proposed disturbance area. However, these residences could experience indirect effects related to sharing roads with construction traffic, increased human activity from

construction and drilling operations, and fugitive dust dispersion. These effects would be temporary, as traffic would lessen once construction and reclamation is completed. The proposed projects may have beneficial indirect effects, such as increased overall employment opportunities related to the oil and gas industry and support service industry in the area. There may be increased economic benefits for the State of New Mexico and San Juan County from royalty payments and taxes.

Cumulative Impacts

Social and Economic Features

Other foreseeable actions that would cumulatively and beneficially impact social and economic features in the area include the construction, operation, and production of oil and/or natural gas wells, which fuel the local economy by providing employment for the local population, as well as tax revenue for area communities. The Proposed Action would incrementally add to existing and future social and economic impacts in the general area.

Environmental Justice

Indirect impacts to the minority community identified above, from the Proposed Action, would be primarily short term and would occur from increased traffic during construction and initial reclamation. Similar impacts would be expected from the additional oil and gas development predicted under the RFD scenario. This oil and gas development would be spread across the area and would not be concentrated to Census Tract 9432.01 or the community of Nageezi. Any positive effects to the overall population from economic multipliers related to the oil and gas extraction industry would also be greater when taking into account the past, present, and future oil and gas development in the San Juan Basin.

3.12. Public Health and Safety

3.12.1. Affected Environment

A major priority in land management for the BLM FFO is ensuring health and human safety on its public lands. The BLM's goals are to effectively manage safety hazards and hazardous materials, protect the health and safety of public land uses, protect the natural and environmental resources, minimize future hazardous risks including costs and liabilities, and mitigate physical hazards in compliance with all applicable laws, regulations, and policies. The BLM follows its national, state, and local contingency plans as it applies to emergency responses. These plans are also consistent with federal and state laws and regulations.

Worker safety is regulated under the Occupational Health and Safety Act of 1970, as amended (29 USC 651), which requires employers and operators to provide a safe and healthy workplace for employees. Under this act, OSHA mush track and monitor reportable incidents of accidents and injuries. OSHA also requires that all chemicals stored within project areas during construction and operation must be handled according to label directions for each chemical. All chemicals present within the project area must also have a Material Safety Data Sheet (MSDS) located in a specified central location where it could be accessed during an emergency situation. These MSDSs must be kept up to date and any new chemical added to a project area must have an MSDS added to the existing catalog.

Additional safety regulations found in Pipeline Safety Programs and Rulemaking Procedures (49 CFR 190) and Transportation of Natural and Other Gas by Pipeline: Minimal Federal Safety Standards (40 CFR 192) apply to natural gas pipelines.

The proposed project areas are fairly remote and are located in an area with established oil and gas exploration, development, and transportation. The nearest town/community, Nageezi (population 286 [U.S. Census Bureau 2012]), is approximately 3 to 5 miles southeast of the proposed projects. U.S. Highway 550 is located approximately 1 to 3 miles east of the proposed projects. There are no designated recreation areas, commercial areas, or residential areas within 1 mile of the proposed project areas.

The nearest hospital is in Farmington, New Mexico. This hospital is approximately 36 to 38 air miles or approximately 46 to 50 road miles northwest of the proposed well pads.

Encana is committed to operating its facilities in a safe and environmentally sound manner. To achieve this goal, the company has systems and procedures in place ranging from written operating procedures, required internal policies and standards, and compliance audits/inspections and accountability for correcting findings.

Hazardous Materials

The EPA regulates public health and safety through its Risk Management Program. This program requires facilities using extremely hazardous substances in excess of specified threshold quantities to evaluate typical and worst-case scenarios and have emergency response procedures in place to protect the public and environment. The EPA, along with state and local government agencies, has laws and policies designed to protect the public, including the following:

- Resource Conservation and Recovery Act (RCRA): The RCRA was passed in 1976 and establishes a comprehensive program for managing hazardous wastes from the time they are produced until disposal. The EPA regulations define solid wastes as any “discarded materials” subject to a number of exclusions. A “hazardous waste” is a solid waste that 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. On July 6, 1988, the EPA determined that oil and gas exploration, development, and production wastes would not be regulated as hazardous wastes under the RCRA. A simple rule of thumb was developed to determine whether exploration, development, and production waste is likely to be considered exempt or non-exempt from RCRA regulations. If the waste came from downhole or if 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 the EPA. Typical wastes associated with the Proposed Action include trash, sanitary wastes, produced water, and produced hydrocarbons. Based on the discussion above, these are generally exempt from the RCRA.
- Comprehensive Environmental Response Compensation and Liability Act (CERCLA): This CERCLA was passed in 1980 and 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 NMOCD administers hazardous waste regulations for oil and gas activities in New Mexico.
- EPA Hazardous Substances Reportable Quantities and the Emergency Planning and Community Right-to-Know Act (EPCRA): Hazardous chemicals under the EPCRA are defined within the act and listed in 40 CFR 302–312. If these listed chemicals are stored at quantities greater than reportable quantities, the chemicals must be reported, and any release of a hazardous substance above a specified reportable quantity must be reported to the EPA.

An MSDS must be available for all lists of hazardous substances that may be stored within a project area, and the MSDS must be updated at a minimum of once per month (or more frequently if chemicals are added more often). Any spill of hazardous materials must be cleaned up immediately based on information that is available in the MSDS. If any spill is of a sufficient quantity to require notification and possible emergency response, the NMOCD and BLM FFO must be notified immediately upon discovery of the release. All hazardous substances that are recovered during the cleanup must be handled and disposed of in accordance with available information.

3.12.2. Impacts from Proposed Action

Direct and Indirect Impacts

Some potential health and safety risks are inherent in any construction project and this could include the potential risk of contamination to soil through improper disposal of waste, leaks from equipment, or accidental releases. There is also potential risk from accidental releases of hazardous materials from the proposed projects. Every precaution is made to prevent an accidental release (see Section 2.2.3). When significant amounts of chemicals are stored on-site, governmental agencies would be notified as required under the EPCRA. The notification of hazardous substance releases outside the proposed project areas would take place, as required under CERCLA and NMAC 19.15.29. In addition, all proposed facilities would have informational signs, as directed under 43 CFR 3160.

During the proposed construction, drilling, completion, and maintenance phases of the proposed projects, the operation of equipment could pose potential safety concerns, as existing facilities (e.g., oil and gas wells, pipelines, and power lines) could be damaged or ruptured. These damages could pose a risk to human safety. As described in Section 2.2.3 (Proposed Project Design Features and Best Management Practices), approximately 630 feet of new access road (STA 39+87.57 to STA 46+17.82) associated with the proposed Escrito D20 project would be rerouted around the northern side of Dugan's active Harvey No. 2 well pad in order to avoid potential health and safety concerns that could arise by having vehicles travel through the center of the active well pad.

The proposed projects would affect transportation. During the construction phases, the proposed projects would result in increased traffic on area roads, with some vehicles hauling heavy equipment. As a result, there would be an increased potential for traffic accidents for the short term. Following proposed construction activities, traffic levels would be similar to current levels.

Dust associated with construction activities or travel on existing and proposed dirt roads could result in poor visibility in the proposed project areas. The increased use of dirt access roads during muddy conditions would worsen the roads' conditions.

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

During the construction, drilling, completion, production, and operation phases of the proposed projects, physical hazards would be present. The design features and BMPs for the proposed projects (see Section 2.2.3) have been developed to minimize public health and safety risks.

Cumulative Impacts

Risks to public health and safety have been minimized wherever possible and similar mitigation is also required for the reasonably foreseeable future projects identified for the oil prone area described in the RFD. Cumulatively it is expected that the Proposed Action would contribute incrementally to the overall traffic levels associated with other current and foreseeable oil development projects, and this would contribute to the trend of increasing oil and gas traffic using area roads.

4. SUPPORTING INFORMATION

4.1. Tribes, Individuals, Organizations, or Agencies Consulted

Table 29 contains a list of tribes, individuals, organizations, and agencies invited to attend the pre-disturbance on-site meetings for the proposed projects.

Table 29. Tribes, Individuals, Organizations, and Agencies Invited to the On-Site Meetings

Name	Tribe, Organization, or Agency	Attended On-Site
Ed Blancett	Livestock grazing lease holder	No
--	Huerfano Chapter House of Navajo Nation	No
--	San Juan Citizens Aliance	No
Thomas Singer	Western Environmental Law Center	No
Tim Ream	Wild Earth Guardians	No
Bruce Baizel	Earth Works Action	No
Gargy Graham	Western Resources	No

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

The New Mexico BLM has a two-party protocol with the New Mexico SHPO (BLM-SHPO 2014) specifically encouraged by the NPA. This protocol details how the New Mexico BLM and SHPO will regulate their relationship and consult. Specifically, this document outlines among other things, how and when consultation will be conducted between the BLM, SHPO, tribes, and the public. The protocol also outlines when case-by-case SHPO consultation is or is not required for specific undertakings and the procedures for evaluating the effects of common types of undertakings and resolving adverse effects to historic properties. These common types of undertakings regularly include the common actions undertaken in the BLM FFO.

4.2. List of Preparers

This EA was prepared by SWCA in conformance with the standards of and under the direction of the BLM FFO. Table 30 contains a list of individuals that contributed to or reviewed this EA.

Table 30. List of EA Preparers

Name	Area of Expertise	Organization
Marcella Martinez	Planning and Environmental Specialist	BLM FFO
Craig Willems	Environmental Protection Specialist	
Heather Perry	Noxious Weeds Coordinator	
Jeff Tafoya	Supervisor Multiple Resources	
Shane Trautner	Range Management Specialist	
Jillian Aragon	Realty Specialist	
Jim Copeland	Archaeologist	
John Kendall	Wildlife Management Biologist	
Michael Bullock	Natural Resources Specialist	
Michael Porter	Natural Resources Specialist	
Deb Silverman	Archaeological Consultant	LAC
Fred Harden	Archaeological Consultant	

Name	Area of Expertise	Organization
Leslie Sesler	Archaeological Consultant	
Paul Stirniman	Archaeological Consultant	
Steven Fuller	Archaeological Consultant	
Amber Ballman	Natural Resources Project Manager	SWCA
Annie Lutes	NEPA Writer	
Eilene Lyon	Biologist/Botanist	
Evan Crawford	Biologist	
Eric Creeden	GIS Specialist/Biologist	
Paige Marchus	NEPA Reviewer	

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