

**UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT**

Farmington District  
Farmington Field Office  
6251 N College Blvd., Ste. A  
Farmington, NM 87402

**DECISION RECORD  
for the**

**Encana Oil & Gas (USA) Inc.'s  
Nageezi Unit 513H-514H  
Oil and Natural Gas Well Projects**

**NEPA No. DOI-BLM-NM-F010-2016-0210-EA  
IT4RM-F010-2016-0088-EA  
ATS-F010-16-58**

**I. Decision**

I have decided to select Alternative B (Proposed Action) for implementation as described in the Encana Oil & Gas (USA) Inc.'s Nageezi Unit 513H-514H Oil and Natural Gas Well Project. Based on my review of the Environmental Assessment (EA) and project record, I have concluded that Alternative B was analyzed in sufficient detail to allow me to make an informed decision. I have selected this alternative because the proposed projects would allow Encana access to their proposed drilling sites in order to vertically drill for natural gas within their valid and existing leases.

**II. Conformance and Compliance**

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

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

### **III. Finding of No Significant Impact**

I have reviewed the direct, indirect and cumulative effects of the proposed activities documented in the EA for the Encana Oil & Gas (USA) Inc.'s Nageezi Unit 513H-514H Oil and Natural Gas Well Project. I have also reviewed the project record for this analysis. The effects of the proposed action and alternatives are disclosed in the Alternatives and Environmental Consequences sections of the EA. I have determined that the construction of a well pad, pipeline tie and access road to allow Encana Oil & Gas (USA) Inc. reasonable access to the mineral lease in order to develop the existing lease as described in the EA will not significantly affect the quality of the human environment. Accordingly, I have determined that the preparation of an Environmental Impact Statement is not necessary.

### **IV. Other Alternatives Considered**

No reasonable alternatives to the proposed action have been developed that would result in significantly fewer impacts or any clear advantages over the proposed action. The proposed access road and proposed pipeline corridor follows the most economic and direct route based on the location of existing Encana Oil & Gas (USA) Inc.'s infrastructure, existing disturbance, surface resources, and terrain.

### **V. Rationale for the Decision**

Pursuant to 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21, this site-specific environmental assessment (EA) tiers to and incorporates by reference the information and analysis contained in the Farmington Proposed Resource Management Plan/Final Environmental Impact Statement [(PRMP/FEIS) BLM 2003a]. This EA is in conformance with the management goals set forth in the Resource Management Plan (RMP) for the Farmington Field Office (FFO) of the BLM, which was approved by the Record of Decision (ROD) signed September 29, 2003 (BLM 2003b). Specifically, this action is in conformance with 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 (2003b, 2-2). The PRMP/FEIS, RMP, and ROD are available for review at the BLM Farmington Field Office, 6251 College Blvd., Farmington, NM, or electronically at:

[http://www.nm.blm.gov/ffo/ffo\\_home.html](http://www.nm.blm.gov/ffo/ffo_home.html)

I have determined that the activities described in the proposed action will not adversely affect or cause loss or destruction of scientific, cultural, or historical resources, including those listed in or eligible for listing in the National Register of Historic Places (40 CFR 1508.27(b)(8)). The proposed activities are not located in an ACEC containing relevant and important cultural values. Cultural resource surveys were completed. Known cultural resources will be avoided by project activities, protected through employee education, archaeological monitoring, and site protection barriers (DOI-BLM-NM-F010-2016-0210-EA, p. 16).

The proposed activities are not likely to adversely affect any endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act (40 CFR 1508.27(b)(9)). The project area does not contain any known populations of threatened or endangered species. The project area is located within the BLM FFO-designated habitat zone for Aztec gilia/Brack's fishhook cactus. No individuals of Aztec gilia/Brack's fishhook cactus were observed within the project area. Since no individuals were identified within the proposed project area during the biological survey, the proposed project would not likely impact individuals of these two species. (DOI-BLM-NM-F010-2016-0210-EA, p. 44).

## **VI. Public Involvement**

The Notice of Staking was made available for the public to review at the Farmington Field Office. No comments were received. The project was posted on the Farmington Field Office NEPA log [http://www.blm.gov/nm/st/en/prog/planning/nepa\\_logs.html](http://www.blm.gov/nm/st/en/prog/planning/nepa_logs.html).

## **VII. Administrative Review and Appeal**

Under BLM regulations, this Decision Record (DR) is subject to administrative review in accordance with 43 CFR 3165. Any request for administrative review of this DR, with or without oral presentation, must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, 301 Dinosaur Trail, Santa Fe, NM 87508, no later than 20 business days after this DR is received or considered to have been received.

Any party who is adversely affected by the State Director's decision may appeal that decision to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

This decision to authorize a right-of-way may be appealed to the Interior Board of Land Appeals (IBLA), Office of the Secretary, in accordance with the regulations contained in 43 CFR Part 4. Any appeal must be filed within 30 days of this decision. Any notice of appeal must be filed with the Field Manager, Bureau of Land Management, Farmington Field Office, 6251 College Boulevard, Suite A, Farmington, NM 87402. The appellant shall serve a copy of the notice of appeal and any statement of reasons, written arguments, or briefs on each adverse party named in the decision, not later than 15 days after filing such document (see 43 CFR 4.413(a)). Failure to serve within the time required will subject the appeal to summary dismissal (see 43 CFR 4.413(b)). If a statement of reasons for the appeal is not included with the notice, it must be filed with the IBLA, Office of Hearings and Appeals, U. S. Department of the Interior, 801 North Quincy St., Suite 300, Arlington, VA 22203 within 30 days after the notice of appeal is filed with the Farmington Field Office Manager.

Notwithstanding the provisions of 43 CFR 4.21(a)(1), filing a notice of appeal under 43 CFR Part 4 does not automatically suspend the effect of the decision. If you wish to file a petition for a stay of the effectiveness of this decision during the time that your appeal is being reviewed by the Board, the petition for a stay must accompany your notice of appeal.

A petition for a stay is required to show sufficient justification based on the following standards:

- (1) The relative harm to the parties if the stay is granted or denied;
- (2) The likelihood of the appellant's success on the merits;
- (3) The likelihood of immediate and irreparable harm if the stay is not granted; and
- (4) Whether the public interest favors granting the stay.

In the event a request for stay or an appeal is filed, the person/party requesting the stay or filing the appeal must serve a copy of the appeal on the Office of the Field Solicitor:  
United States Dept. of the Interior, Office of the Solicitor, Southwest Regional Office,  
505 Marquette Avenue NW, Suite 1800, Albuquerque, NM 87102

/s/Richard A. Fields  
Richard A. Fields  
Field Manager  
Farmington Field Office

5/12/16  
Date

**UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT**

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**Finding of No Significant Impact**

**Encana Oil & Gas (USA) Inc.'s  
Nageezi Unit 513H-514H  
Oil and Natural Gas Well Projects**

**NEPA No. DOI-BLM-NM-F010-2016-0210-EA  
IT4RM-F010-2016-0088-EA  
ATS-F010-16-58**

**FINDING OF NO SIGNIFICANT IMPACT**

I have determined that the proposed action, as described in Environmental Assessment (EA) DOI-BLM-NM-F010-2016-0210 will not have any significant impact, individually or cumulatively, on the quality of the human environment. Because there would not be any significant impact, an Environmental Impact Statement is not required.

In making this determination, I considered the following factors:

***Context***

The Farmington Field Office (FFO) is located in northwestern New Mexico. The field office boundaries include approximately 7,800,000 acres; 1.4 million surface acres and an additional 1 million acres of mineral estate are managed by the BLM. The distribution of BLM-managed lands is fairly well consolidated in the north and becomes increasingly mingled with Tribal lands to the south. BLM-managed lands abut the Navajo Reservation to the west and south, Jicarilla Apache Nation Reservation to the east, and the Ute Mountain Reservation and Southern Ute Indian Reservation to the north. Aztec Ruins National Monument and Chaco Culture National Historical Park, managed by the National Park Service, lie within the field office boundaries. The BLM manages approximately 18% of lands within a 10 mile radius of Chaco Culture National Historical Park.

The FFO encompasses the New Mexico portion of the San Juan Basin. The San Juan Basin and surrounding areas have been occupied by varied cultures since the Paleo Indian period (circa 10,000 BC). The San Juan Basin and Four Corners area have one of the most extensive prehistoric and protohistoric occupations in the United States. The most commonly known archaeological resources are the Anasazi structures at Chaco Culture National Historical Park, Mesa Verde National Park, and other National Park Service sites. Scattered across BLM-managed lands are similar, but smaller structures, which were probably related to these larger sites. Twenty-three Chacoan outliers are known to exist within the FFO. Each contains at least one Chacoan structure and most have associated communities, prehistoric roads, and great kivas along with features such

as herraduras and special use areas. The FFO contains an extensive system of finely engineered roads radiating out from Chaco Canyon and extending a considerable distance to outlying sites through the San Juan Basin and beyond. These roads are remarkably straight and carefully constructed. The most notable is the Great North Road, which starts at Chaco Canyon and runs north to the Aztec Ruins.

Located within the boundary of the FFO is much of Dinétah, the ancestral homeland to the Navajo. Here the Navajo constructed forked-stick hogans, shades, sweat lodges, and other structures over a several hundred year span. During a short period between 1680 and the mid-1700s, pueblitos were constructed, often associated with other structures. Although not firmly dated, extensive Navajo pictograph and petroglyph sites were painted, etched, pecked, or ground onto the sandstone cliffs of the canyons of Dinétah. Most are believed to be ceremonial art which is no longer traditionally executed in a permanent form.

Native American Traditional and Sacred Areas are known to exist across the FFO. Many are associated with narrative accounts of origin or other traditional stories. Most of the identified sacred areas are associated with the Navajo culture. These places are still important in Navajo ceremonies and daily activities.

Historic Hispanic or Spanish and Anglo sites within the San Juan Basin primarily date from the late 1800s to the present. Although there are some early Spanish land grants in the southern portion of the FFO, most historic sites located on public lands are either Hispanic or Anglo homesteads with associated structures from the late 1800s and early 1900s. Associated with many clusters of homesteads were a school house and often a church which was visited every few months by a priest.

Cultural resource inventories have been conducted throughout the FFO for project undertakings, management studies, and scientific inquiries. As of April 2014, approximately 760,000 acres of the 7,800,000 acres in the FFO boundaries have been inventoried. Over 46,000 sites have been identified ranging from small artifacts to the 800-room structures in Chaco Canyon. Many of these sites are listed on the National Register of Historic Places and Chaco Culture National Historical Park along with several of the Chacoan sites which have been placed on the World Heritage List. The FFO manages 79 Areas of Critical Environmental Concern (ACECs) for relevant and important cultural values, including five World Heritage Sites.

The San Juan Basin is an important area for mammalian and reptilian fossils. A variety of paleontological resources exist in the FFO including animal fossils, fossil leaves, palynomorphs, petrified wood, and trace fossils occurring in the Triassic, Jurassic, Cretaceous, and Tertiary rocks. Dinosaur and other fossils that have made significant contribution to the scientific record have been found and excavated in the FFO. Paleontological resources are present in the Bisti De-Na-Zin Wilderness Area, Ah-Shi-Sle-Pa Wilderness Study Area, Fossil Forrest Research Natural Area, and seven fossil areas identified in the 2003 Farmington Resource Management Plan.

The San Juan Basin is one of the largest natural gas fields in the nation and has been under development for more than 60 years. Oil was discovered by accident in the Seven Lakes area of McKinley County in 1911. Natural gas was discovered near Aztec, New Mexico, in 1920-1921 with oil of commercial quantity discovered near the Hogback in 1922 (Barnes 1951). Several small pipelines were built to carry the oil and gas from these discoveries to Aztec and Farmington,

respectively. Development began in earnest in the late 1940s and early 1950s as the demand for natural gas increased. The FFO manages 2,765 active oil and gas leases in the San Juan Basin consisting of 2.1 million acres. Leasing began in the mid-1930s and accelerated in the late 1940s. By 1950, over 1 million acres were under lease.

In 1951, El Paso Natural Gas completed the first interstate pipeline out of the San Juan Basin to California. That same year, oil was discovered in the Mancos Shale in Dogie Canyon (Barnes 1951). Since that time, over 30,000 oil and gas wells have been drilled in the San Juan Basin with approximately 16,000 associated rights-of-way. Approximately 23,000 wells are currently producing. Since Stanolind Oil introduced hydraulic fracturing in 1949, nearly every well in the San Juan Basin has been fracture stimulated.

### ***Intensity***

1. The activities described in the proposed action do not include any significant beneficial or adverse impacts (40 CFR 1508.27(b)(1)). Per 40 CFR 1500.1(b), the EA concentrated on issues that are truly significant to the action in question, rather than amassing needless detail. Issues have a cause and effect relationship with the proposed action or alternatives; are within the scope of the analysis; have not been decided by law, regulation, or previous decision; and are amendable to scientific analysis rather than conjecture (BLM 2008, page 40). The following issues were identified related to the proposed:

- 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?
- 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?

The EA includes a description of the expected environmental consequences of the proposed activities for those issues in Chapter 3.

2. The activities included in the proposed action and alternatives would not significantly affect public health or safety (40 CFR 1508.27(b)(2)). The following design features have been included in the proposed action to address any impacts to public health and safety:

- The hauling of equipment and materials for the proposed project on public roads would comply with Department of Transportation regulations. No toxic substances would be stored or used within the proposed project area. Encana would have inspectors present during construction. Any accidents involving persons or property would immediately be reported to the BLM-FFO. Encana would notify the public of potential hazards by posting signage, as necessary.
- There are no designated recreation areas or commercial areas within 1 mile. The closest populated area is approximately 3 to 5 miles to the southeast. The proposed project area is accessible to the public by dirt roads.
- Vehicles would be restricted to proposed disturbance areas and existing areas of surface disturbance, such as existing roads and well pads.
- 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 regulations, and Department of Transportation regulations.
- 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 area and/or when activities would cause irreparable harm to roads, soils, or watercourses.
- The nearest hospital is in Farmington, New Mexico. This hospital is approximately 40 air miles or approximately 55 road miles from the proposed project area.

3. The proposed activities would not significantly affect any unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas (40 CFR 1508.27(b)(3)). Unique characteristics are generally limited to those that have been identified through the land use planning process or other legislative, regulatory or planning processes (BLM 2008, page 71). The FFO does not contain any prime and unique farmlands, suitable or designated wild and scenic rivers, or designated caves. Table 1 discloses the distance of the proposed activities to identified wetlands. Table 2 discloses the distance of the proposed activities to National Park Service units and Congressionally designated areas. The proposed action and alternatives are not located within an Area of Critical Environmental Concern. Impacts to historic or cultural resources are described in the Cultural Resources section of the EA and discussed further under item 8.

**Table 1. Distance of the Proposed Activities from Identified Wetlands**

Identified Wetlands	Distance from Proposed Activities
Bancos	53 miles
Blanco	32 miles
Bloomfield	34 miles
Cutter Canyon	31 miles

Carrizo Oxbow	29 miles
Desert Hills	35 miles
Valdez	33 miles

**Table 2. Distance of the Proposed Activities from Park Lands and Ecologically Critical Areas**

Park Land or Ecologically Critical Area	Distance from Proposed Activities
Ah-Shi-Sle-Pah Wilderness Study Area	6 miles
Aztec Ruins National Monument	43 miles
Bisti De-Na-Zin Wilderness Area	12 miles
Chaco Culture National Historical Park	12 miles
Fossil Forest Research Natural Area	15 miles

4. The activities described in the proposed action do not involve effects on the human environment that are likely to be highly controversial (40 CFR 1508.27(b)(4)). Controversy in this context means disagreement about the nature of the effects, not expressions of opposition to the proposed action or preference among the alternatives (BLM 2008, page 71). Oil and gas development has occurred in the San Juan Basin for more than 60 years. While there may be controversy over the appropriateness of oil and gas development, there is not a high level of controversy or substantial scientific dispute over the impacts of that activity. The impacts of the proposed activities are described in Chapter 3 of the EA.

5. The activities described in the proposed action do not involve effects that are highly uncertain or involve unique or unknown risks (40 CFR 1508.27(b)(5)). As described under Context, oil and gas development has occurred in the San Juan Basin since the late 1940s and early 1950s. The field office has permitted over 30,000 wells and 16,000 rights-of-way. Hydraulic fracturing has occurred on nearly every well in the San Juan Basin since the 1950s. As such, the FFO has decades of experience and is knowledgeable about the impacts and risks associated with the proposed activities.

6. My decision to implement these activities does not establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration (40 CFR 1508.27(b)(6)). Approval of these activities in no way assures approval of any future activities.

7. The effects of the proposed activities would not be significant, individually or cumulatively, when considered with the effects of other actions (40 CFR 1508.27(b)(7)). Direct, indirect, and cumulative impacts are described in Chapter 3 of the EA.

8. I have determined that the activities described in the proposed action will not adversely affect or cause loss or destruction of scientific, cultural, or historical resources, including those listed in or eligible for listing in the National Register of Historic Places (40 CFR 1508.27(b)(8)). The proposed activities are not located in an ACEC containing relevant and important cultural values. Cultural resource surveys were completed. Known cultural resources will be avoided by project activities, protected through employee education, archaeological monitoring, and site protection barriers (DOI-BLM-NM-F010-2016-0210-EA, p. 16).

9. The proposed activities are not likely to adversely affect any endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act (40 CFR 1508.27(b)(9)). The project area does not contain any known populations of threatened or endangered species. The project area is located within the BLM FFO-designated habitat zone for Aztec gilia/Brack's fishhook cactus. No individuals of Aztec gilia/Brack's fishhook cactus were observed within the project area. Since no individuals were identified within the proposed project area during the biological survey, the proposed project would not likely impact individuals of these two species. (DOI-BLM-NM-F010-2016-0210-EA, p. 44).

10. The proposed activities will not threaten any violation of Federal, State, or local law or requirements imposed for the protection of the environment (40 CFR 1508.27(b)(10)). Sections 1.4 and 1.5 of the EA describe the relationship of the proposed activities to relevant laws, policies, regulations, and plans.

## REFERENCES

Barnes, Frank C., 1951. History of development and production of oil and gas in the San Juan Basin. In *The south and west sides of the San Juan Basin, New Mexico and Arizona*, Smith, C.T.; Silver, C. ed(s), New Mexico Geological Society, Guidebook, 2<sup>nd</sup> Field Conference, pp. 155-160.

BLM. 2008. *National Environmental Policy Handbook. H-1790-1*. Bureau of Land Management. National Environmental Policy Act Program.

## APPROVED:

/s/Richard A. Fields

Richard A. Fields  
Field Manager  
Farmington Field Office

5/12/16

Date

**United States Department of the Interior  
Bureau of Land Management**

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**Environmental Assessment DOI-BLM- NM-F010-2016-0210-EA  
IT4RM-F010-2016-0088-EA**

***Encana Oil & Gas (USA) Inc.'s  
Nageezi Unit 513H-514H  
Oil and Natural Gas Well Project***

**April 2016**

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U.S. Department of the Interior  
Bureau of Land Management  
Farmington District  
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New Mexico • Farmington Field Office



**It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.**

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# 1. PURPOSE AND NEED FOR THE ACTION

## 1.1. Background

Encana Oil & Gas (USA) Inc. (Encana) has submitted two Applications for Permit to Drill (APDs) to the Bureau of Land Management (BLM) Farmington Field Office (FFO) for the Nageezi Unit 513H–514H Oil and Natural Gas Well Project (Proposed Action). The BLM FFO is the lead agency for the Proposed Action because it manages the surface and mineral estate associated with the proposed project. The Federal Indian Minerals Office (FIMO) are a cooperating agency.

The proposed project would involve the construction of one well location, and the horizontal drilling, possible production, and final abandonment of two oil and natural gas wells. Each well would access Federal and Navajo allotted minerals permitted under an approved APD issued by the BLM FFO. 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**

Mineral Lease Number	Mineral Ownership			
NO-G-1401-1831		X		X
NO-G-1402-1884		X	X	X
NO-G-1403-1920		X		X
NMNM 8005	X		X	X

The surface features associated with the project would consist of a well pad (including construction zone), new access road, upgraded access road, well-connect pipeline, and staging area. The surface features would be permitted under the APDs. The proposed well-connect pipeline would connect to Encana’s Nageezi Unit 503H–504H pipeline (American Petroleum Institute [API] numbers 30-045-35546 [503H] and 30-045-35547 [504H] and BLM FFO environmental assessment [EA] identification number DOI-BLM-NM-F010-2014-0149 and IT4RM-F010-2016-088-EA). The surface features associated with the project are provided in Table 2. It is anticipated that if the APDs are approved, construction of the proposed project would commence in 2016.

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

Surface Feature	Length		
New access road	2,173	–	BLM FFO
Upgraded access road	3,859	–	
Well pad and construction zone	–	500 × 530	
Well-connect pipeline	1,727	–	
Staging area	–	Irregular shape	

The proposed project area is located on surface managed by the BLM FFO in the San Juan Basin of northwestern New Mexico (Figure 1). Specifically, the proposed project is situated in San Juan County and is located approximately 33 miles south of the town of Bloomfield and 2 miles southwest of the community of Nageezi.

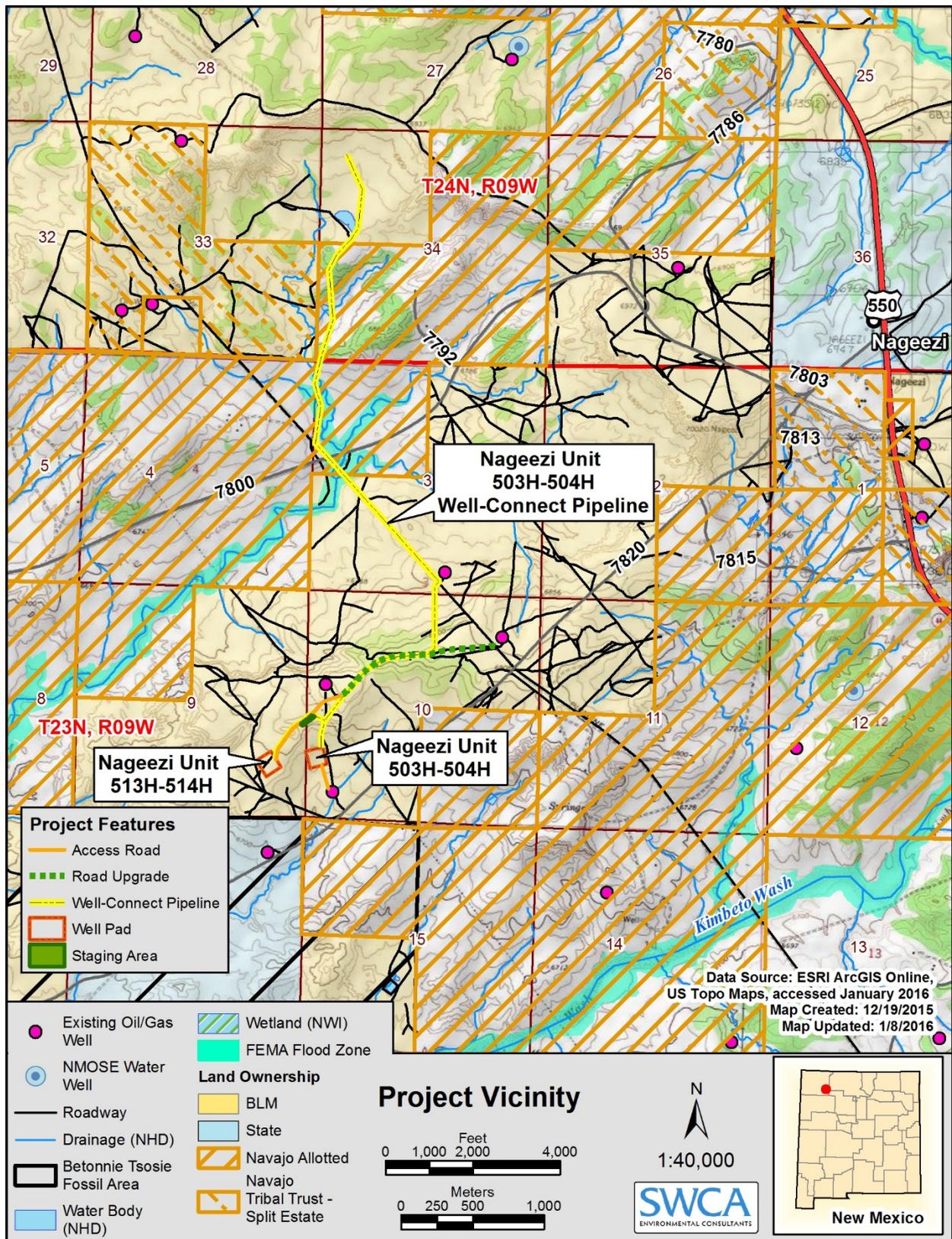


Figure 1. General location map.

SWCA Environmental Consultants (SWCA) conducted a biological survey of the proposed project area and prepared a biological survey report (BSR), which is provided in Appendix A. Photographs were taken of the proposed project area and are included in Appendix B. A complete set of survey plats, maps, and driving directions for the proposed project are included in Appendix C. A surface reclamation plan for the proposed project is provided in Appendix D. Additionally, La Plata Archaeological Consultants (LAC) prepared a cultural resource inventory for the proposed project, which is on file with the BLM FFO.

This 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 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.

## 1.2. Purpose and Need for the Action

The purposes for the Proposed Action are as follows:

- The BLM's purpose is to consider Encana 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 consider Encana to have access to Navajo 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.) 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. It is the policy of the BLM, as derived from several laws, including the MLA, to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs. Per the Federal Onshore Oil and Gas Leasing Reform Act, the BLM is required to respond to a request for an APD.

The FIMO's need for the Proposed Action is established by 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.

## 1.3. Decision to be Made

Based on the information in this EA, the BLM FFO will decide whether to issue the APDs, and if so, under what terms and conditions. Under 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. The BLM FFO Field Manager is the responsible officer who will decide:

- to approve the APDs with design features as submitted;
- to approve the APDs with additional mitigations;
- to analyze the effects of the proposal in an environmental impact statement; or
- to deny the APDs.

## 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 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, resource uses, 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 project 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. Regulations that were not in effect during the 2003 RMP process must now be considered 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.

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### **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.

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### **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).

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### **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 and 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.

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### **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 stormwater 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 project is exempt from Section 402 of the CWA because the stormwater generated from the proposed project 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.

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### **1.5.7. Executive Order 12898**

EO 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). The Proposed Action is in compliance with EO 12898.

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## **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. A pre-disturbance on-site meeting attended by Encana, BLM FFO representatives, SWCA, and LAC was held for the proposed project. The pre-disturbance on-site meeting took place on December 1, 2015.

The BLM FFO invited the Nageezi Chapter House of the Navajo Nation and the lease holder for livestock grazing within the proposed project area to the December 1, 2015, pre-disturbance on-site meeting. A public invitation was emailed to the chapter house, private citizens/groups, and grazing allottee(s) on November 19, 2015. No representatives from the chapter house, private citizens/groups, or the grazing allottee attended the meeting.

The BLM FFO’s Interdisciplinary Team of resource specialists discussed the Proposed Action on December 7, 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/fo/Farmington\\_Field\\_Office/ffo\\_nepa.html](http://www.blm.gov/nm/st/en/fo/Farmington_Field_Office/ffo_nepa.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.

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### **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?
- 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 noxious 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*), and loggerhead shrike (*Lanius ludovicianus*)?
- Cultural Resources: How would the Proposed Action [and alternatives] impact cultural resources, including historic properties, properties listed on the National Register of Historic Places (NRHP) or New Mexico State Register of Cultural Properties, Chaco Protection Sites, World Heritage Sites, National Historic Trails, or other places of traditional religious and cultural importance?
- 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 area?
- 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?

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### **1.6.3. Issues Considered but Not Analyzed**

Several resources commonly analyzed under NEPA either do not occur within the vicinity of the proposed project area 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.

#### **Water Resources**

##### **Surface Water**

According to USGS maps (USGS 2013b), no watercourses are present within or adjacent to the proposed project area. Therefore, the Proposed Action would not result in the discharge of materials into a water of the U.S.

##### **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 a biological survey of the proposed project area on December 7, 2015. No USFWS-listed threatened or endangered species or their habitats were found in the proposed project area during the biological survey (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 area is included in the BSR [Appendix A]).

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 has 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 2014-2xxx [LAC 2016]), and a review by the BLM's cultural resources program regarding the presence of places of traditional religious and cultural importance) 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 area. The Proposed Action would not impact any known places of traditional religious and cultural importance, 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 and managing, that is based on the scenic quality and visual resource inventory for the subject area along with other visual resource considerations such as potential users or sensitive viewers. The proposed project is located within a Visual Resource Management Classes III and IV management areas, which are the least restrictive classes on potential development.

There are no residences in proximity to or visible from the proposed project area. 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 Federal Land Policy and Management Act of 1976 (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. The proposed project area is not within an ACEC. The nearest ACEC is the Betonnie Tsosie, which is approximately 880 feet south of the proposed project area. Because this ACEC is beyond the visual and auditory vicinity of the proposed project area, ACECs are 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. If the APDs 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. Additionally, the associated surface disturbance (i.e., construction of the proposed well pad, new access road, well-connect pipeline, and staging area) would not occur, and current uses in the area would continue. The No Action alternative is presented as the baseline for impacts analysis 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 to seek BLM FFO and FIMO approval of two APDs associated with the project.

The Proposed Action would include well pad construction, and the drilling, production, and final abandonment of two 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. The proposed project would consist of the construction, use, and reclamation of an associated well pad (including construction zone), new access road, well-connect pipeline, and staging area. Additionally, an existing, unnamed road would be upgraded for providing access to the proposed project area.

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

#### 2.2.1. Location of Proposed Project Area

The proposed project area is located within the BLM FFO on surface managed by the BLM FFO in the San Juan Basin of northwestern New Mexico. Specifically, the proposed project is located in San Juan County, approximately 33 miles south of the town of Bloomfield and 2 miles southwest of the community of Nageezi. The proposed project can be found on the Kimbeto, New Mexico USGS 7.5-minute quadrangle (see Figure 1 in Section 1.1). The proposed project is located within Township 23 North, Range 9 West (New Mexico Prime Meridian [NMPM]) (Figure 2). The sections and quarter-quarters for the 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 (see Appendix C).

**Table 3. Legal Land Descriptions and Surface Ownership**

Project Features	Legal Location within Township 24 North, Range 9 West (NMPM)	
	Quarter-Quarter	Section
New access road	NE ¼ of SE ¼	9
	SW ¼ of NW ¼	10
	NW ¼ of SW ¼	
Upgraded access road	N ½ of NE ¼ SW ¼ of NE ¼ S ½ of NW ¼	10
Well pad and construction zone	E ½ of SE ¼	9
Well-connect pipeline and staging area	NE ¼ of SE ¼	

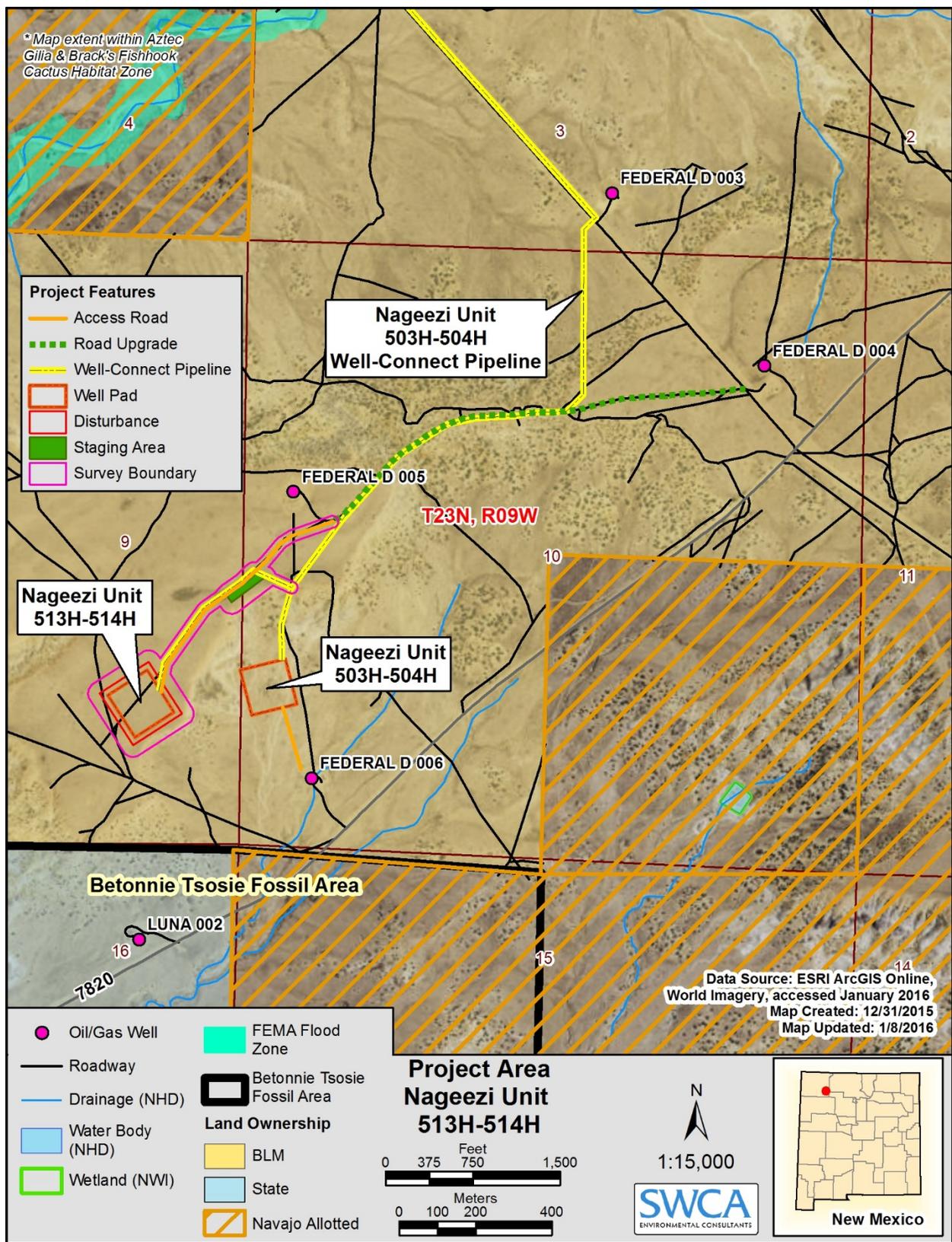


Figure 2. Project aerial photograph map.

Elevation in the proposed project area ranges from 6,790 to 6,880 feet above mean sea level (amsl). Existing oil and gas lease roads, well pads, and utility corridors are in the general vicinity of the proposed project area. A map with an aerial photograph of the proposed project area is provided above (see Figure 2).

## 2.2.2. Proposed Surface Disturbance

The proposed project would result in 9.7 acres of new surface disturbance. Of this, 1.6 acres would be reseeded (but not recontoured) and 5.8 acres would be fully reclaimed (reseeded and recontoured) during interim reclamation. The remaining 2.3 acres would remain disturbed throughout the life of the proposed project. Surface disturbance is summarized in Table 4 and in the subsections below.

**Table 4. Surface Disturbance Associated with Proposed Project**

Project Feature	Surface Disturbance (acres)		Interim Reclamation		Long-Term Disturbance (Final Reclamation)
	Total	New	Reseeded and Recontoured	Reseeded Only	
Access roads	2.1	2.1	0.0	1.2	0.9
Well pad and construction zone	6.1	6.1	4.7	0.0	1.4
Well-connect pipeline	1.6	1.1	1.1	0.0	0.0
Staging area	0.5	0.4	0.0	0.4	0.0
<b>Total</b>	<b>10.3</b>	<b>9.7</b>	<b>5.8</b>	<b>1.6</b>	<b>2.3</b>

### Access Roads

The new access road would be 2,173 feet long and 30 feet wide (1.5 acres). The new access road would follow an existing two-track road from access road station (STA) numbers 1+71 to 19+29. The two-track road is not currently maintained; therefore, the new access road is being considered new surface disturbance in its entirety. Two 150 × 20-foot (0.2-acre) pullouts would be utilized along the new access road from STA 0+48 to 1+98 and STA 13+99 to 15+49.

An existing, unnamed 3,859-foot-long road would be upgraded as part of the project. This road is an existing road that has been previously disturbed and is maintained; therefore, the road upgrade is not being considered new surface disturbance. However, four 150 × 20-foot (0.4-acre) pullouts would be utilized along the upgraded road and are being considered new surface disturbance. The pullouts would be located from STA 1+60 to 3+10, STA 14+50 to 16+00, STA 22+00 to 23+50, and STA 32+90 to 34+40.

The 14-foot-wide running surface of the new access road, the bottoms of the bar ditches alongside the new access road, and 150 × 10 feet of the pullouts (0.9 acre, total) would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation. The remaining 1.2 acres along the pullout slopes and outside the 14-foot-wide running surface and bar ditches of the new access road would be reseeded during interim reclamation but not recontoured.

### 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 1,727 feet long and 40 feet wide (1.6 acres). Portions of this corridor would overlap with disturbance associated with other portions of the project, as described below.

Therefore, new surface disturbance associated with the well-connect pipeline corridor would be 1.1 acres. All of this disturbance would be reseeded and recontoured during interim reclamation.

- Approximately 1,214 feet of the well-connect pipeline corridor length would travel parallel and adjacent to the project access road. Where the well-connect pipeline corridor parallels the access road, approximately 20 feet of the corridor would overlap the access road. There would be 0.6 acre of new surface disturbance associated with this portion of the well-connect pipeline corridor.
- Approximately 513 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.

## Staging Area

The 0.5-acre staging area is an irregularly shaped feature that would be located along the southern side of the new access road from STA 8+32 to 11+32. A 0.1-acre portion of the well-connect pipeline corridor would overlap disturbance associated with the staging area. Therefore, new surface disturbance associated with the staging area 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 staging area.

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### 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.

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 project, refer to the APDs 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 (NOX) 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 attached to the APDs would also be used for controlling fugitive dust.

## Soils

The top 6 inches of topsoil would be stripped from the surface of the proposed project area during the construction phase of the project. 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 pipeline. 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 area becomes 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 area 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 project.

Hydrostatic test water from the proposed project 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 corridor, 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 5.

**Table 5. 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

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

- A silt trap would be placed within the well pad construction zone near the eastern corner (corner 5).
- Stormwater would be diverted from corner 5 to the southern corner of the well pad (corner 6). Between corners 5 and 6, stormwater would be fanned out into the nearby sagebrush shrubland.
- Stormwater would be diverted from the northern corner of the well pad (corner 3) to the silt trap at corner 5 and to the western corner of the well pad (corner 2). Between corners 2 and 3, stormwater would be fanned out into the nearby sagebrush shrubland.
- Four 24-inch-diameter culverts would be placed beneath the new access road at the following STAs: 0+00, 3+83, 19+15, and 21+73.
- Two 24-inch-diameter culverts would be placed beneath the upgraded access road at the following STAs: 3+00 and 8+74.

## Wildlife

### General Wildlife

Wildlife hazards, such as storage tanks, associated with the proposed project 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 the 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 trench. Escape ramps or crossovers would be constructed every 1,320 feet within the trench. 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. The trench would not be left open for more than 24 hours. If the 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 trench 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 the 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 project, they would be netted to prevent birds from entering them.

Because the proposed project would disturb more than four acres of vegetation, if construction activities associated with the proposed project would occur during the migratory bird breeding season (May 15–July 31), a pre-construction nesting survey of the proposed project area would take place up to 1 week prior to vegetation removal within the 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.

Pre-construction nesting surveys would also establish the occupancy status of potentially suitable nesting burrows detected within the project area for burrowing owls (*Athene cunicularia*). If any active burrowing owl burrows are identified, a 490-foot avoidance radius would be established around the active nest site. No suitable nesting burrows were identified during SWCA's December 7, 2015, biological survey.

Should any active raptor nests be observed within 0.3 mile of the proposed project area 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 area. 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 project. These procedures were referenced during the preparation of Encana's surface reclamations plan (see Appendix D).

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 sagebrush community best represents the proposed project area. During the pre-disturbance on-site meeting, plant species were chosen from the BLM FFO's seed pick list for the sagebrush community. The plant species picked for reclamation are provided in the surface reclamation plan (see Appendix D).

## Noxious Weeds and Invasive Species

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

If Encana does not hold a current Pesticide Use Proposal, one 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 area is 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 (see Appendix A), during SWCA's biological survey, no Aztec gilia or Brack's fishhook cactus were identified within the proposed project area.

Should any special status species be observed within the proposed project area 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 area. 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 the proposed project 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. 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 project 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., 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 Covert Green to blend with the surrounding landscape.

## **Livestock Grazing**

Livestock grazing operators in the vicinity of the proposed project area 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 project 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.

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

If present, established livestock trails would be left in place as crossovers across the well-connect pipe trench. Escape ramps or crossovers would be constructed every 1,320 feet within the trench. If active livestock grazing is occurring in the proposed project area, 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. The trench would not be left open for more than 24 hours. If the 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 trench would be sloped (3 to 1) each night to allow livestock to escape.

Before the 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 trench would be excavated and sloped in accordance with OSHA specifications.

Soil stockpiles and well-connect pipe string(s) would be used as safety barriers during construction of the proposed well-connect pipeline. If the 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 corridor would be limited to pipeline construction crews.

## **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 area 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 area 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 attached to the approved APDs.

## 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 project is located within the Nageezi Chapter of the Navajo Nation. The chapter house contact on file with the BLM FFO would be notified prior to construction.

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### 2.2.4. Proposed Project Phases

For a detailed description of construction practices associated with the proposed project, refer to the APDs on file at the BLM FFO. The Proposed Action would consist of seven phases: 1) upgrade of existing road; 2) construction of well pad, access road, and staging area; 3) drilling and completion; 4) construction of well-connect pipeline; 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.

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

## Upgrade of Existing Road

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

As described in Section 2.2.2 (Proposed Surface Disturbance), 3,859 feet of an existing, unnamed road would be upgraded as part of the project. This road is an existing road that has been previously disturbed and is maintained. The upgraded access road would start at an existing, unnamed road and end at the start of the proposed new access road (see Figure 2). Additionally, four pullouts would be utilized along the upgraded road from STA 1+60 to 3+10, STA 14+50 to 16+00, STA 22+00 to 23+50, and STA 32+90 to 34+40. 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).

## Construction of Well Pad, Access Road, and Staging Area

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

The proposed well pad and access road would be cleared of vegetation and leveled. The proposed 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 plan (see Appendix D).

### Well Pad

The size of the proposed well pad is 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 the proposed well pad are provided in Table 6.

**Table 6. 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
500 × 530	12.1	Corner 3	7.1	Corner 6

The proposed well pad would be constructed from the existing soil material accumulated during construction activities. The excavated material from well pad cuts would be used on the fill portions of the proposed well pad in order to create a level 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 Road

The new proposed access road would be 2,173 feet long. The maximum estimated road grade would be 3 percent. A 30-foot-wide workspace would be associated with the proposed access road, which would include a 14-foot-wide running surface with adequate crowning. The proposed access road would be designed and constructed as a resource road 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 road, as necessary, to accommodate year-round traffic and meet all-weather standards. The proposed access road would be maintained for the life of the proposed project in accordance with *The Gold Book* (BLM and USFS 2007) and Encana's road maintenance plan attached to the APDs on file with the BLM FFO.

The proposed access road would be constructed from the native borrow soil and subsoil accumulated during construction activities. If additional fill or surfacing material would be needed for the proposed access road, Encana would obtain the material from an existing permitted or private source and would haul the material by truck using existing roads.

### Staging Area

As described in Section 2.2.2 (Proposed Surface Disturbance), one staging area would be associated with the proposed project. The staging area would be located along the southern side of the new access road from STA 8+32 to 11+32.

## 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 area using the new access road, upgraded access road, 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 staging area construction has been completed for the proposed 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 project is targeting horizontal wells. The proposed wells would be targeting the Nageezi Unit oil pools. The proposed wells would be drilled from the wellheads to the bottom holes provided on the plats (see Appendix C).

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 fractures 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 Pipeline**

If the proposed wells prove to be productive, a 6-inch outside diameter, 1,727-foot-long, steel well-connect pipeline would be constructed within a 40-foot-wide right-of-way (ROW) for the proposed project. The lifetime of the well-connect pipeline is anticipated to be 30 to 50 years. Construction would take 4 to 5 weeks for the proposed well-connect pipeline. The proposed well-connect pipeline would carry natural gas from the wells to the tie-in location, which would be Encana's Nageezi Unit 503H–504H pipeline (API numbers 30-045-35546 [503H] and 30-045-35547 [504H] and BLM FFO EA identification number DOI-BLM-NM-F010-2014-0149).

Site preparation for the 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 plan (see Appendix D).

The proposed well-connect pipeline 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 Covert Green.

## **Interim Reclamation**

If the proposed wells prove to be productive, portions of the proposed project area 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 plan (see Appendix D). The areas to be reclaimed during interim reclamation are described in Section 2.2.2 (Proposed Surface Disturbance) and the surface reclamation plan (see Appendix D).

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 the proposed project site. Production equipment that would remain on the 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 Covert 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 the proposed well-connect pipeline would be 500 pounds per square inch gauge.

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

## **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.

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 pipeline would typically be plugged and left in place.

During final reclamation, the following equipment could be utilized on-site: pickup 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 plan (see Appendix D). Reclamation activities are described in the surface reclamation plan (see Appendix D).

## **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 pad in a southeastern to northwestern direction. With the utilization of horizontal drilling technologies, there is some flexibility in the placement of well pad 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 the 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 project were submitted to the BLM FFO as part of Encana’s Notice of Staking for the proposed project. The maps and shapefiles are on file with the BLM FFO.

Two wells would be drilled from the proposed well pad. Using the SHL polygon and feasibility maps and SHL polygon shapefile, Encana was able to place the proposed wells 190 to 200 feet northwest of the ideal well location (1,100 feet from the south line and 710 feet from the east line of Section 9, Township 23 North, Range 9 West).

Encana considered four alternatives to the current proposed project surface disturbance areas; however, these alternatives were dismissed. The four dismissed alternatives that were reviewed and the reasons for being dismissed are provided below.

- Originally, Encana intended to drill the two proposed wells from the northwest to the southeast rather than the current southeast to northwest direction. Drilling from northwest to southeast would have resulted in a well pad located in the eastern half of the southeastern quarter of Section 5, Township 23 North, Range 9 West. This location was dismissed because homes and tribal tents would have been in proximity to the project surface disturbance areas.
- Encana analyzed adding the proposed wells to the Nageezi Unit 503H–504H well pad (API numbers 30-045-35546 [503H] and 30-045-35547 [504H] and BLM FFO EA identification number DOI-BLM-NM-F010-2014-0149). However, this was not feasible because the Nageezi Unit 503H–504H well pad is located 200 to 300 feet east of Encana’s SHL polygon. This would have resulted in resource recovery issues from technical limitations associated with horizontal drilling.
- Encana evaluated a new access road and well-connect pipeline that started/ended at the Nageezi Unit 503H–504H well pad because the access road and well-connect pipeline would have been shorter than the current proposed new access road and well-connect pipeline corridor. However, this was not feasible due to steeply sloping badland hills being located between the Nageezi Unit 513H–514H and Nageezi Unit 503H–504H well pads.
- Encana attempted to overlap existing disturbance (i.e., unmaintained two-track road) for the majority of the proposed new access road. However, approximately 171 feet of the existing two-track road could not be overlapped due to cultural resource issues. As a result, Encana shifted the proposed new access road in this area to avoid this environmental resource.

No other potential project locations would result in less surface disturbance impacts and/or environmental impacts. In addition, 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.

## 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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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 0.04% to 0.05% 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 area 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

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#### 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 7.

**Table 7. 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 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 Escavada Wash (1408010603) intersected by the proposed project area. This area was chosen because it is an area with clear natural topographical boundaries with vegetative connectivity, similar soil types, and hydrological functionality. (Figure 3).	147,284	2 years (short-term) More than 2 years (long-term)
Livestock Grazing	Kimbeto Community (Allotment No. 6013)	103, 498	2 years (short-term) More than 2 years (long-term)
Environmental Justice and Socioeconomics	Qualitative analysis; see Section 3.10.2		
Public Health and Safety	Qualitative analysis; see Section 3.11.2		

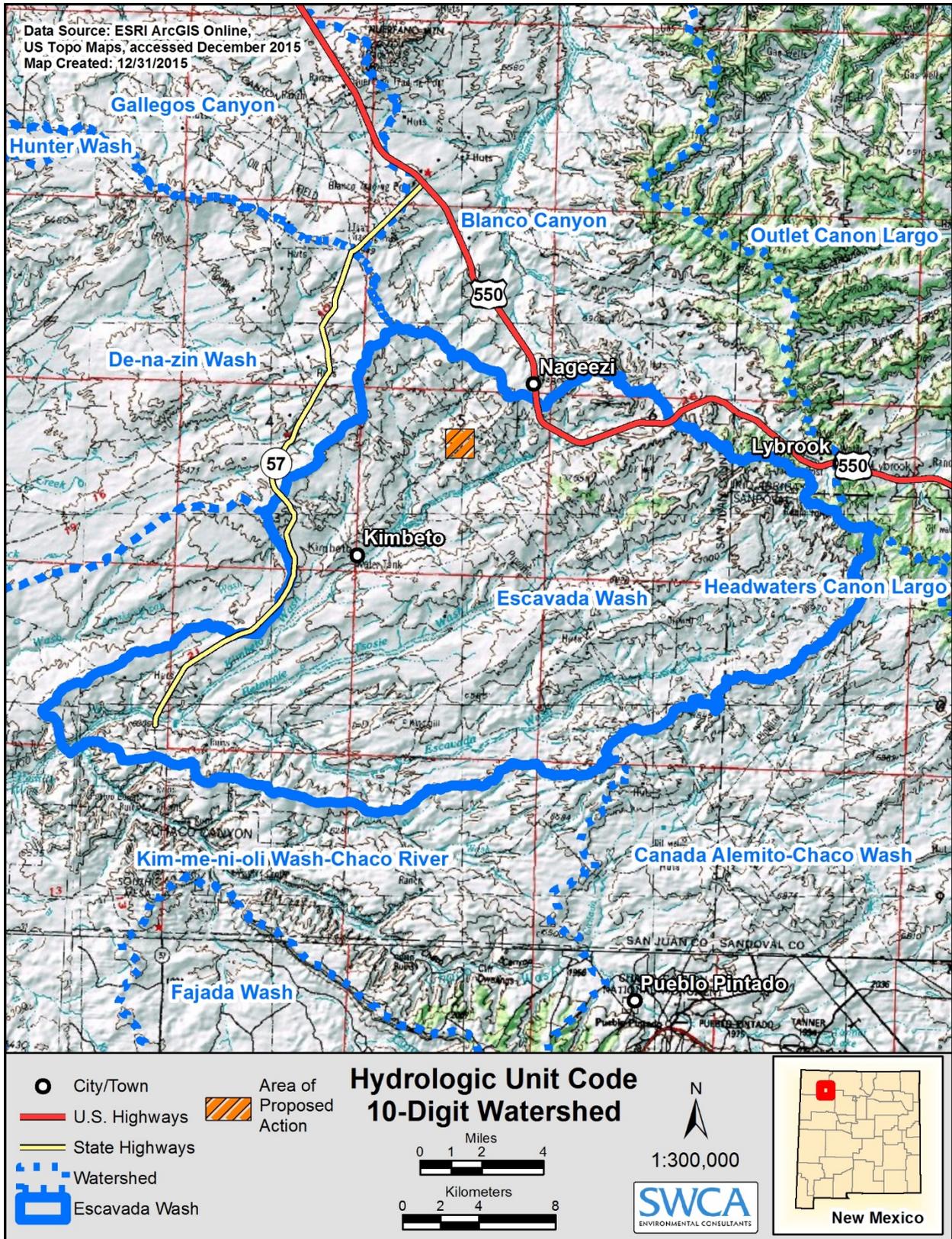


Figure 3. Proposed Action within the Escavada Wash Watershed (HUC 1408010603).

### 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 the Oil and Natural Gas Administration and Revenue Database (ONGARD). 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 8 shows the approximate amount of existing past disturbance in acres.

**Table 8. Past Disturbance by Impact Analysis Areas**

Impact Analysis Area	Past Disturbance (acres)	Percentage of Analysis Area
HUC 10-digit watershed: Escavada Wash (1408010603)	78.8	0.05%
Kimbeto Allotment (Allotment No. 6013)	42.8	0.04%

#### 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.

In addition to the present and future oil development methodology described above, a previously approved Encana location, the Nageezi Unit 503H–504H project (API numbers 30-045-35546 [503H] and 30-045-35547 [504H] and BLM FFO EA identification number DOI-BLM-NM-F010-2014-0149), is located in proximity to the Proposed Action. The Nageezi Unit 503H–504H project includes the construction of an

access road, well pad, well-connect pipeline, and staging area. As of February 2016, this project had not been constructed and would constitute future oil development. This project would consist of 18.3 acres of short-term disturbance and 2.3 acres of long-term disturbance.

Table 9 identifies the potential disturbance in acres from reasonably foreseeable future oil wells.

**Table 9. 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: Escavada Wash (1408010603)	2,134.5	1.45%	491.3	0.33%
Kimбето Allotment (Allotment No. 6013)	717.3	0.69%	164.3	0.16%

### Present and Future Gas Development

The proposed project does 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 project.

### 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 pounds) or cow/calf pair for 1 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<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), 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 2014). 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<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter (particulate matter equal to or less than 10 microns in diameter [PM<sub>10</sub>] and particulate matter equal to or less than 2.5 microns in diameter [PM<sub>2.5</sub>]), sulfur dioxide (SO<sub>2</sub>), 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 10. 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<sub>10</sub> design concentrations are not available for San Juan County.

**Table 10. 2012 Criteria Pollutant Monitored Design Values in San Juan County**

Pollutant	2012 Design Concentration	Averaging Time	NAAQS	NMAAQS
O <sub>3</sub>	0.071 ppm	8-hour	0.075 ppm <sup>1</sup>	
NO <sub>2</sub>	13 ppb	Annual	53 ppb <sup>2</sup>	50 ppb
NO <sub>2</sub>	38 ppb	1-hour	100 ppb <sup>3</sup>	
PM <sub>2.5</sub>	4.7 µg/m <sup>3</sup>	Annual	12 µg/m <sup>3,4</sup>	60 µg/m <sup>3,6</sup>
PM <sub>2.5</sub>	14 µg/m <sup>3</sup>	24 hour	35 µg/m <sup>3,3</sup>	150 µg/m <sup>3,6</sup>
SO <sub>2</sub>	19 ppb	1-hour	75 ppb <sup>5</sup>	

Source: EPA 2014a.

Note: ppm = parts per million; ppb = parts per billion = µg/m<sup>3</sup> = micrograms per cubic meter.

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.

In 2005, the EPA estimates that there was less than 0.01 ton per square mile of lead emitted in BLM 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 11). On 8 days in the past decade, air quality has reached the level of “unhealthy” and on 2 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 1 day that was “unhealthy” during each year. In 2010, there were 5 “unhealthy” days and 2 “very unhealthy days.”

**Table 11. 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 2014). The EPA conducts a periodic National Air Toxics Assessment (NATA) that quantifies HAP emissions by county in the United States. 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 12 shows climate normals for the 30-year period from 1981 to 2010 for the Farmington, New Mexico, area.

**Table 12. Climate Normals for the Farmington Area, 1981–2010**

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

Source: data collected at New Mexico State Agricultural Science Center - Farmington

<sup>1</sup>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

CO<sub>2</sub> 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 2014).

#### Direct and Indirect Impacts

##### Criteria Pollutants

Table 13 shows estimated emissions from one proposed horizontal oil well for criteria pollutants, VOCs and GHGs. For comparison, Table 14 shows total human-caused emissions for each of the counties in the BLM FFO and La Plata County, Colorado, based on the EPA's 2011 emissions inventory (EPA 2014b).

**Table 13. Criteria Pollutant and VOC Emissions Estimated for Construction of One Horizontal Oil Well; Average 25 Days to Drill and Complete**

Activity	NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>
<b>One time operations (tons)</b>								
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
<b>Ancillary operations (tons)</b>								
Workover	0.129	0.04	0.01	0.01	0.01	-	-	10.59
Road Maintenance	-	-	-	-	-	-	-	0.26

Activity	NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>
Road Traffic	-	-	-	-	-	-	-	0.06
<b>Annual operations (tons/yr)</b>								
Oil Haul Truck and Small Truck (100 bbl/day)	0.009	0.006	0.0012	0.0009	0.0008	-	0.0001	3.88
<b>Total</b>	<b>6.13</b>	<b>1.64</b>	<b>0.55</b>	<b>2.54</b>	<b>0.29</b>	<b>0.11</b>	<b>0.01</b>	<b>671.54</b>

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 14. Analysis Area Emissions in Tons/Year, 2011**

County	NO <sub>x</sub> <sup>1</sup>	CO <sup>2</sup>	VOC <sup>3</sup>	PM <sub>10</sub> <sup>4</sup>	PM <sub>2.5</sub> <sup>5</sup>	SO <sub>2</sub> <sup>6</sup>
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
<b>Total</b>	<b>75,187.7</b>	<b>144,551.5</b>	<b>57,265.1</b>	<b>222,168.9</b>	<b>26,407.2</b>	<b>7,237.9</b>

<sup>1</sup> NO<sub>x</sub> – nitrogen oxides

<sup>2</sup> CO – carbon monoxide

<sup>3</sup> VOC – volatile organic compounds

<sup>4</sup> PM<sub>10</sub> – particulate matter with an aerodynamic diameter equal to or less than 10 microns

<sup>5</sup> PM<sub>2.5</sub> – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns

<sup>6</sup> SO<sub>2</sub> – sulfur dioxide

Table 15 displays the percent increase in total emissions in the analysis area from the Proposed Action to construct and operate one horizontal oil well.

**Table 15. Percent Increase in Analysis Area Emissions from the Proposed Action**

	NO <sub>x</sub> <sup>1</sup>	CO <sup>2</sup>	VOC <sup>3</sup>	PM <sub>10</sub> <sup>4,5</sup>	PM <sub>2.5</sub> <sup>5,6</sup>	SO <sub>2</sub> <sup>5,7</sup>
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 <sup>(8)</sup>	2.54	0.29	0.11
<b>Percent Increase</b>	<b>0.008</b>	<b>0.001</b>	<b>0.02</b>	<b>0.001</b>	<b>0.001</b>	<b>0.002</b>

<sup>1</sup> NO<sub>x</sub> – nitrogen oxides

<sup>2</sup> CO – carbon monoxide

<sup>3</sup> VOC – volatile organic compounds

<sup>4</sup> PM<sub>10</sub> – particulate matter with an aerodynamic diameter equal to or less than 10 microns

<sup>5</sup> Values derived from average emissions for any well drilling in the analysis area. Calculated results available upon request.

<sup>6</sup> PM<sub>2.5</sub> – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns

<sup>7</sup> SO<sub>2</sub> – sulfur dioxide

<sup>8</sup> 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<sub>2</sub> and CH<sub>4</sub>. To compare the GHG emissions from the Proposed Action estimated by the calculator with statewide GHG emissions, carbon dioxide equivalent (CO<sub>2</sub>e) emissions for both CH<sub>4</sub> and CO<sub>2</sub> were summed. The total statewide GHG emission estimate for 2007 was 76,200,000 metric tons CO<sub>2</sub>e (76.2 million metric tons) (NMED 2010). The estimated CO<sub>2</sub>e metric tons emissions from one horizontal oil well (609.2 metric tons) would represent a 0.0008% increase in New Mexico CO<sub>2</sub> 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 2014).

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 2014). 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 2014) 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 analysis area for impacts to soils is the Escavada Wash watershed (HUC10-1408010603). The Escavada Wash watershed lies within the geologic San Juan Basin. 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 (2016), two soil types are mapped within the proposed project area. Soils within the proposed project area are classified as having low to moderate potential for wind erosion and moderate potential for water erosion (Natural Resources Conservation Service 2016) (Table 16). 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 (see Appendix A).

**Table 16. Soils in the Proposed Project Areas**

Soil Type	Percentage of Project Area
DS – Doak-Sheppard-Shiprock association, rolling	97%
FX – Fruitland-Persayo-Sheppard complex, hilly	3%

Source: Natural Resources Conservation Service 2016.

### 3.3.2. Impacts from Proposed Action

#### Direct and Indirect Impacts

New surface disturbance associated with the proposed project would be 9.7 acres of direct impacts. Of this, 2.3 acres would be long-term disturbance and would remain as bare, compacted surface for the life of the proposed project. The remaining 7.4 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 area. The removal of vegetation within the proposed project area could result in increased soil erosion within and downstream of the proposed project area. 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 area. 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.

Following construction, the compaction of soils, reclamation of portions of the proposed project area, and implementation of erosion-control measures in accordance with the Design Features and BMPs as outlined in Section 2.2.3 and the Surface Reclamation Plan (Appendix D) would minimize soil impacts due to erosion. These BMPs include, but are not limited to; salvage and stockpiling of topsoil, recontouring and reseeding of areas not used on a regular basis; replacement of the sub-surface soils and topsoil in the proper order; proper road design and maintenance and storm water control (diversions).

#### Cumulative Impacts

The analysis area and impact indicator for cumulative impacts is the same as for direct and indirect impacts. Past, present, and reasonably foreseeable future actions within the Escavada Wash watershed which may impact soils would mainly result from surface disturbance associated with oil and gas development. One hundred and five (105) oil and gas wells have been developed in the Escavada Wash watershed. These wells have resulted in a long-term disturbance of about 79 acres of surface disturbance. Based on the 326 potential wells assumed in the RFD (Engler, et al., 2014), oil and gas development in the Escavada Wash watershed may result in approximately 2,116 acres of short-term disturbance from potential future development, with approximately 1,627 acres of that being reclaimed. This results in about 490 acres of long-term surface disturbance from potential future oil and gas development in the Escavada Wash watershed. The total long-term disturbance for existing and potential

oil and gas development in the Escavada Wash watershed would be approximately 568 acres. This disturbance would have the same impacts as described for direct and indirect impacts. These impacts would be greatest immediately following project construction and decrease over time as reclamation success progress. Cumulatively the Proposed Action would account for approximately 1% of the overall short-term disturbance and approximately 0.54 % of the overall long-term disturbance.

The analysis area and impact indicator for cumulative impacts is the same as for direct and indirect impacts. Past, present, and reasonably foreseeable future actions within the Escavada Wash watershed (147,284-acres) which may impact soils would mainly result from surface disturbance associated with oil and gas development. Impacts from past and present actions have attributed approximately 78.8 acres of surface disturbance, from 105 oil and gas well pads with associated roads and pipelines. Past actions account for soil disturbance on approximately 0.05% of the analysis area.

Based on the 326 potential wells assumed in the RFD (Engler, et al., 2014), oil and gas development in the Escavada Wash watershed may result in approximately 2,116 acres of short-term disturbance from potential future development, of that approximately 1,627 acres would be reclaimed shortly after drilling and completion stages. Future oil and gas development would contribute approximately 491.3 acres (0.33% of the analysis area) of long-term surface disturbance within the analysis area.

The Proposed Action would add approximately 9.7 acres of short-term surface disturbance and 2.3 acres of long-term surface disturbance to the past, present, and reasonably foreseeable actions calculated above. Together, the cumulative surface disturbance would total 2,223.0 acres (1.51% of the analysis area) of short-term surface disturbance and 572.4 acres (0.39% of the analysis area) of long-term surface disturbance within the analysis area.

Other surface-disturbing activities in the analysis area that may also result in impacts to soils include: livestock grazing, vegetation management, and recreation. Livestock grazing in the analysis area contributes to soil erosion, as well as the alteration of soil composition through the breakdown and spread of organic matter. Livestock grazing is closely managed by both land owners and the BLM; livestock grazing is expected to continue at the same rate and in the same manner as it currently occurs. As such, impacts would be similar to those currently experienced and would not likely increase beyond the current state. Vegetation manipulation and management activities, such as sagebrush clearing and prescribed fires that impact soils are often implemented by land managers. These activities are likely to occur at varying levels in the analysis area in the future, however, it is not possible to predict when and to what extent with any certainty. Recreation, specifically in the form of Off-highway Vehicle (OHV) use, may likely result in soil erosion and compaction. These impacts cannot be quantified with any level of certainty, as they are highly dependent on enforcement of regulations on federal lands and vary greatly on private lands. All these land uses are likely to contribute a minor component in impacts to soil resources. Cumulatively these impacts coupled with the O&G impacts would not appreciably affect the soils within the Escavada Wash watershed.

## 3.4. Upland Vegetation

### 3.4.1. Affected Environment

The proposed project is 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* sp.), 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* sp.) 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 one land cover type is present within and surrounding the project area: Inter-Mountain Basins Semi-Desert Shrubland Steppe (USGS 2004). During the biological survey, biologists identified one vegetation community within the proposed project area: sagebrush shrublands. Three oneseed juniper (*Juniperus monosperma*) trees were identified within the survey area. No trees were identified within the proposed project surface areas. Vegetative cover within and surrounding the proposed project area is approximately 60% to 75%. Past uses include livestock grazing activities and development activities, such as existing utility line ROWs and roads. A description of the Southwest Regional Gap Analysis project land cover type and additional details regarding the field-verified vegetation community are provided in the BSR (see Appendix A).

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### **3.4.2. Impacts from Proposed Action**

#### **Direct and Indirect Impacts**

During the construction phase, all vegetation within the 9.7-acre area associated with the proposed project would be cleared and directly impacted. Short-term impacts (7.4 acres) would occur during site preparation and would continue until revegetation of the proposed project area by faster-growing plants is achieved, which is estimated to be 2 years after the interim reclamation phase. Long-term, permanent impacts (2.3 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 area that were not reclaimed during interim reclamation.

It was determined during the pre-disturbance on-site meeting that the BLM-FFO Designated sagebrush community best represents the proposed project area. During interim and final reclamation, the seed mixtures associated with this vegetation community would be used for the proposed project. Proposed reclamation activities and seed mixture are described further in the surface reclamation plan (see Appendix D).

Re-established vegetation would consist of native species included in the seed mixture 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 area; these species and their impacts are described in Section 3.5 (Noxious Weeds and Invasive Species). Although the replanting of disturbed soils could successfully establish vegetation in some portions of the proposed project area (i.e., with a biomass and species richness similar to those of local native communities), the resulting plant community could be quite different from the native community 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 pad and access road, 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 area (Eveling and Bataille 1984). Plant community composition surrounding the proposed project area 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 147,284-acre analysis area (Escavada Wash Watershed [HUC 1408010603]) include approximately 78.8 acres of

surface disturbance, including past construction of 105 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 0.05% 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 2,134.5 acres (1.45 % of the analysis area) of additional surface disturbance and 491.3 acres (0.33% 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 project area. Generally, native vegetation loss and the spread of noxious weeds and invasive species would be expected to occur, especially during construction of the future action. The proposed project would require BMPs and other mitigation to reduce these impacts. In time, the reclaimed areas would result in stable plant communities; however, within reclaimed areas, it is not expected that the vegetation community would return to native conditions within 20 years (BLM 2003a:4–18).

The Proposed Action would add approximately 9.7 acres of short-term surface disturbance and 2.3 acres of long-term surface disturbance to the past, present, and reasonably foreseeable actions calculated above (0.01% and less than 0.01%, respectively, of the Escavada Wash Watershed [HUC 1408010603] for upland vegetation). Together, the cumulative surface disturbance would total 2,223.0 acres (1.51% of the Escavada Wash Watershed [HUC 1408010603] for upland vegetation) of short-term surface disturbance and 572.4 acres (0.39% of the Escavada Wash Watershed [HUC 1408010603]) of long-term surface disturbance within the analysis area.

## **3.5. Noxious Weeds and Invasive Species**

### **3.5.1. 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 several species as federally listed noxious weeds to be targeted for control or eradication (USDA 2010, 2012).

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 several 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).

No USDA-listed, BLM FFO–listed, or NMDA-listed Class A or B species were observed within the surface disturbance areas associated with the proposed project. One NMDA-listed Class C noxious weed (cheatgrass [*Bromus tectorum*]) was observed in the course of the biological survey for the proposed project. The cheatgrass population was identified along the new access road and well-connect pipeline corridor. This population is depicted on Figure A.2 in the BSR (see Appendix A).

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### **3.5.2. 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 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 site from infested areas by equipment used at the site. Noxious weeds and invasive species could also spread from established populations near the proposed project area 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 area 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, 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).

Design features and BMPs have been developed for the proposed project (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 147,284-acre analysis area (Escavada Wash Watershed [HUC 1408010603]) include approximately 78.8 acres of surface disturbance, including past construction of 105 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 0.05% 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 2,134.5 acres (1.45 % of the analysis area) of additional surface disturbance and 491.3 acres (0.33% 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 area. Generally, native vegetation loss and the spread of noxious weeds and invasive species would be expected to occur, especially during construction of the future action. The proposed project would require BMPs and other mitigation to reduce these impacts. In time, the reclaimed areas would result in stable plant communities; however, within reclaimed areas, it is not expected that the vegetation community would return to native conditions within 20 years (BLM 2003a:4–18).

The Proposed Action would add approximately 9.7 acres of short-term surface disturbance and 2.3 acres of long-term surface disturbance to the past, present, and reasonably foreseeable actions calculated above (0.01% and less than 0.01%, respectively, of the Escavada Wash Watershed [HUC 1408010603])

for noxious weeds and invasive species). Together, the cumulative surface disturbance would total 2,223.0 acres (1.51% of the Escavada Wash Watershed [HUC 1408010603] for noxious weeds and invasive species) of short-term surface disturbance and 572.4 acres (0.39% of the Escavada Wash Watershed [HUC 1408010603]) of long-term surface disturbance within the analysis area.

## 3.6. Wildlife

### 3.6.1. Affected Environment

#### General Wildlife

The Arizona/New Mexico Plateau 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 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 area (BLM 2012). No signs of prairie dogs were observed during the biological survey.

As stated in Chapter 1 (see Section 1.6.3 [Issues Considered but Not Analyzed]) and the BSR (see Appendix A), a biological survey of the proposed project area was conducted on December 7, 2015. SWCA biologists detected two bird species (common raven [*Corvus corax*] and horned lark [*Eremophila alpestris*]) and three mammal species (coyote tracks [*Canis latrans*], desert cottontail [*Sylvilagus audubonii*], and fox tracks [*Vulpes* sp.]) during the biological survey of the proposed project area.

#### 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 [see Appendix A]);
- 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 area is provided in Table 17.

**Table 17. Migratory Birds with Potential to Occur in the Proposed Project Area**

Species Name		Potential to Occur in the Proposed Project Area
Common	Scientific	
Bendire’s thrasher	<i>Toxostoma bendirei</i>	May occur
Black-throated sparrow	<i>Amphispiza bilineata</i>	May occur
Brewer’s sparrow	<i>Spizella breweri</i>	May occur
Gray vireo	<i>Vireo vicinior</i>	Unlikely
Loggerhead shrike	<i>Lanius ludovicianus</i>	May occur
Mountain bluebird	<i>Sialia currucoides</i>	May occur

Species Name		Potential to Occur in the Proposed Project Area
Common	Scientific	
Mourning dove	<i>Zenaida macroura</i>	May occur
Sage sparrow	<i>Amphispiza belli</i>	May occur
Sage thrasher	<i>Oreoscoptes montanus</i>	May occur
Scaled quail	<i>Callipepla squamata</i>	Unlikely
Swainson's hawk	<i>Buteo swainsoni</i>	May occur
Vesper sparrow	<i>Pooecetes gramineus</i>	Unlikely

During the biological survey of the proposed project area, two bird species (common raven and horned lark) were observed or heard. No bird nests were observed during the biological survey of the proposed project.

### **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 survey of the proposed project area. Bald eagles are unlikely to occur in the proposed project area due to the lack of water, trees, and preferred prey. Golden eagles could potentially occur in the proposed project area due to the presence of suitable foraging habitat.

## **3.6.2. Impacts from Proposed Action**

### **Direct and Indirect Impacts**

There is available, similar habitat in the region surrounding the proposed project area that wildlife and migratory birds could utilize. However, 9.7 acres of vegetation (habitat) would be cleared during the construction phases associated with the proposed project. Of this, 7.4 acres would be transformed to reclaimed land during interim reclamation and 2.3 acres would consist of long-term disturbance. The removal of vegetation would result in habitat loss and fragmentation for wildlife and migratory bird species.

Surface-disturbing activities could affect wildlife 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 wildlife. 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.

Vegetation impacts are discussed in Section 3.4 (Upland Vegetation). If interim and final reclamation are successful, the native vegetation communities would become re-established within the proposed project area. However, as discussed in Section 3.4 (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 area could have a long-term impact to wildlife and migratory birds by modifying habitat within and adjacent to the proposed project area. The change in vegetative species composition could modify cover and foraging opportunities for wildlife and migratory birds. 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 area would increase above present levels. Additional well equipment could also cause increased noise levels in the vicinity of the proposed project. Aural and visual disturbances associated with the proposed project could cause indirect habitat loss by deterring wildlife and migratory birds from using available habitat adjacent to the proposed project area.

### **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 2,703 linear feet (2,173 feet of the new access road and 530 feet along the longest side of the proposed well pad) of new, short-term habitat fragmentation resulting from the proposed project. This fragmentation would exist until final reclamation is deemed successful. The upgraded access road, proposed well-connect pipeline, and proposed staging area would parallel/overlap proposed or existing disturbance; therefore, these features would not contribute to new habitat fragmentation.

Using the explanation provided in the paragraph above, the proposed project would result in 2,423 linear feet (2,173 feet of the new access road and 250 feet along the longest side of the proposed well pad) of new, long-term habitat fragmentation.

### **Migratory Birds**

Approximately 9.7 acres of suitable nesting habitat would be impacted by the proposed project. No trees would be removed as a result of the proposed project.

In general, no major or long-term effects on migratory birds are anticipated from the implementation of the proposed project. 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 project because of their mobility and ability to avoid areas of human activity.

If feasible, vegetation removal associated with the 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 the 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 area for burrowing owls. If any active burrowing owl burrows are identified, a 490-foot avoidance radius would be established around the active nest site. No eggs, nestlings, or active nests should be directly harmed by the proposed project between May 15 and July 31.

Due to the mobility of adult birds, it is unlikely that they would be directly harmed by the proposed project. Noise and visual disturbances associated with project construction could temporarily deter this species from utilizing the proposed project area and immediate adjacent lands.

### **Bald and Golden Eagles**

Bald eagles are unlikely to occur in the proposed project area. Approximately 9.7 acres of potential golden eagle foraging habitat would be impacted by the proposed project. There is no suitable nesting

habitat within or adjacent to the proposed project for golden eagles. As a result, the proposed project is 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 147,284-acre analysis area (Escavada Wash Watershed [HUC 1408010603]) include approximately 78.8 acres of surface disturbance, including past construction of 105 oil and gas well pads and associated roads and pipelines. Past actions account for surface disturbance and habitat removal on approximately 0.05% 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 2,134.5 acres (1.45 % of the analysis area) of additional surface disturbance and 491.3 acres (0.33% 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 proposed project area. Generally, no long-term effects would be expected to occur, especially during construction of the future action. The proposed project 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 wildlife species would also adapt to noise associated with maintenance and operation of this action.

The Proposed Action would add approximately 9.7 acres of short-term surface disturbance and 2.3 acres of long-term surface disturbance to the past, present, and reasonably foreseeable actions calculated above (0.01% and less than 0.01%, respectively, of the Escavada Wash Watershed [HUC 1408010603] for wildlife). Together, the cumulative surface disturbance would total 2,223.0 acres (1.51% of the Escavada Wash Watershed [HUC 1408010603] for wildlife) of short-term surface disturbance and 572.4 acres (0.39% of the Escavada Wash Watershed [HUC 1408010603]) of long-term surface disturbance within the analysis area.

## 3.7. Special Status Species

### 3.7.1. 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 (see Appendix A), a biological survey of the proposed project area was conducted on December 7, 2015. The

biological survey included an evaluation of the potential for special status species to occur within the proposed project area. Based on current distribution, habitat requirements and biological survey results, six BLM special status species are known or have the potential to occur within the proposed project area. These species and their habitat requirements are discussed in detail in the BSR (see Appendix A). The special status species that are known to occur or have the potential to occur in the proposed project area are listed below.

- Aztec gilia: The proposed project is located within the BLM FFO–designated habitat zone (BLM 2013b) for this species. Therefore, this species has the potential to occur in the proposed project area. No individuals were identified within the proposed project area during the biological survey.
- Bendire’s thrasher: There is potential foraging and nesting habitat within the proposed project area for this species. No individuals were identified within the proposed project area during the biological survey.
- Brack’s fishhook cactus: The proposed project is located within the BLM FFO–designated habitat zone (BLM 2013b) for this species. Therefore, this species has the potential to occur in the proposed project area. No individuals were identified within the proposed project area during the biological survey.
- Ferruginous hawk: There is potential foraging and nesting habitat within the proposed project area for this species. No individuals were identified within the proposed project area during the biological survey.
- Golden eagle: There is potential foraging habitat within the proposed project area for this species. No individuals were identified within the proposed project area during the biological survey.
- Loggerhead shrike: There is potential foraging and nesting habitat within the proposed project area for this species. No individuals were identified within the proposed project area during the biological survey.

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### **3.7.2. Impacts from Proposed Action**

#### **Direct and Indirect Impacts**

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

#### ***Aztec Gilia and Brack’s Fishhook Cactus***

The proposed project would result in the disturbance of up to 9.7 acres of habitat for Aztec gilia and Brack’s fishhook cactus. Of the 9.7 acres, 2.3 acres of habitat would remain disturbed throughout the life of the proposed project and 2.3 acres of habitat would be reclaimed during interim reclamation.

Since no individuals were identified within the proposed project area during the biological survey, the proposed project would not likely impact individuals of these two species.

If Aztec gilia or Brack’s fishhook cactus is growing in the vicinity of the proposed project, these species could be indirectly impacted by the deposition of fugitive dust generated during vegetation clearing. The deposition of fugitive dust 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 (Eveling and Bataille 1984). 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 3.6, suitable nesting habitat for Bendire’s thrashers and loggerhead shrikes is present within the proposed project area. The proposed project would result in the disturbance of up to 9.7 acres of nesting habitat. Of the 9.7 acres, 2.3 acres of habitat would remain disturbed throughout the life of the proposed projects and 7.4 acres of habitat would be reclaimed during interim reclamation. No trees would be removed as a result of the proposed project.

As described in Section 2.2.3 (Proposed Project Design Features and Best Management Practices), any vegetation removal taking place within the proposed project area during the breeding/nesting 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 project between May 15 and July 31.

Due to the mobility of adult birds, it is unlikely that Bendire's thrashers or loggerhead shrikes would be directly harmed by the proposed project. Temporarily, noise and visual disturbances associated with proposed project construction could deter these species from utilizing the proposed project area and immediate adjacent lands, especially outside of the breeding season (August 1–May 14).

### ***Ferruginous Hawk***

In addition to the direct and indirect impacts described for wildlife in Section 3.6, this species has the potential to forage in the proposed project area year-round. There is a large transmission line in proximity to the eastern portion of the proposed project that could be used by ferruginous hawks for nesting; no active or old nests were identified during the biological survey. The proposed project would result in the disturbance of up to 9.7 acres of habitat. Of the 9.7 acres, 2.3 acres of habitat would remain disturbed throughout the life of the proposed project and 7.4 acres of habitat would be reclaimed during interim reclamation.

If feasible, vegetation removal associated with the proposed project should occur outside the breeding season (early March to late June or early July [New Mexico Partners in Flight 2016]). As described in Section 2.2.3 (Proposed Project Design Features and Best Management Practices), any vegetation removal during the breeding/nesting season would be preceded by a pre-construction nesting survey to identify the possibility of nesting ferruginous hawks. The survey would be conducted following BLM FFO survey guidance and recommendations. If an active nest is identified, a 0.3-mile avoidance radius would be established around the active nest site.

Due to the mobility of adult birds, it is unlikely that ferruginous hawks would be directly harmed by the proposed project. Temporarily, noise and visual disturbances associated with proposed project construction could deter ferruginous hawks from utilizing the proposed project area and immediate adjacent lands.

### ***Golden Eagle***

In addition to the direct and indirect impacts described for wildlife in Section 3.6, there is potential foraging habitat within the proposed project area for golden eagles. The proposed project would result in the disturbance of up to 9.7 acres of foraging habitat. Of the 9.7 acres, 2.3 acres of habitat would remain disturbed throughout the life of the proposed project and 7.4 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 project. Temporarily, noise and visual disturbances associated with proposed project construction could deter golden eagles from utilizing the proposed project area and immediate adjacent lands.

## **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 147,284-acre

analysis area (Escavada Wash Watershed [HUC 1408010603]) include approximately 78.8 acres of surface disturbance, including past construction of 105 oil and gas well pads and associated roads and pipelines. Past actions account for surface disturbance and habitat removal on approximately 0.05% 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 2,134.5 acres (1.45 % of the analysis area) of additional surface disturbance and 491.3 acres (0.33% 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 proposed project area. Generally, native vegetation loss, increased noise, and habitat degradation would be expected to occur, especially during construction of the future action. The proposed project 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 this action.

The Proposed Action would add approximately 9.7 acres of short-term surface disturbance and 2.3 acres of long-term surface disturbance to the past, present, and reasonably foreseeable actions calculated above (0.01% and less than 0.01%, respectively, of the Escavada Wash Watershed [HUC 1408010603] for special status species). Together, the cumulative surface disturbance would total 2,223.0 acres (1.51% of the Escavada Wash Watershed [HUC 1408010603] for special status species) of short-term surface disturbance and 572.4 acres (0.39% of the Escavada Wash Watershed [HUC 1408010603]) of long-term surface disturbance within the analysis area.

## 3.8. Cultural Resources

### 3.8.1. Affected Environment

BLM Manual 8100, The Foundations for Managing Cultural Resources 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"). (BLM 2004b)

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. Traditional cultural properties (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 place's NRHP 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;
- B. are associated with the lives of persons significant in our past;
- 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). Historically in the FFO approximately 80±% of the sites are determined eligible or treated as eligible.

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 NRHP. 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 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 and 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.

The proposed project is located within the archaeologically rich San Juan Basin of northwestern New Mexico. In general, the history of the San Juan Basin can be divided into five major periods: Paleoindian (ca. 10,000–5500 B.C.), Archaic (ca. 5500 B.C.–A.D. 400), Basketmaker II–III and Pueblo I–IV periods (a.k.a. Anasazi; A.D. 1–1540), and the historic (A.D. 1540–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).

The Impact Analysis Area for cultural resources is the Proposed Action APE and the Escavada Wash watershed. Watersheds 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 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 2013a, Natural Resources Conservation Service 2013). The next to smallest hydrologic unit area, typically from 40,000-250,00 acres (62- 390mi<sup>2</sup>; HUC 10) or combination thereof is used for the analysis.

The Escavada Wash watershed is 147,175 acres. Based on New Mexico Cultural Resource Information System data (NMCRIS; July 2015), there are 937 recorded sites and approximately 20% of the watershed (28,856 ac) has been inventoried for cultural resources by 430 unique investigations since 1972. This is a site density of 1:31 acres. Approximately 80% of the sites (n≈750) are historic properties (eligible for the NRHP). According to NMCRIS data approximately 10% of the sites (n≈96) have some disturbance attributed to "construction", presumably from actions conducted prior to the National Historic Preservation Act of 1966 and regular implementation in the early-mid 1970s of cultural resources studies in advance of

some form of development. The current cultural inventory coverage is likely higher as not all survey and site data is digitally available (e.g., Navajo lands, surveys since July 2015).

Within the Escavada Wash watershed there are 133 places of traditional religious and cultural importance, the nearest being >.5 miles away. Current data does not provide information on condition and none have been evaluated for the NRHP. Certain examples such as historic graves are typically not considered historic properties.

Within the Escavada Wash watershed there is one property listed on the National Register of Historic Places (Chaco Culture National Historical Park; CCNHP), two properties on the New Mexico State Register of Cultural Properties (CCNHP, Bis sani), and one Chaco Protection Site (Bis sani). The extreme southwestern edge of the watershed overlaps the northern boundary of the World Heritage Site of Chaco Culture National Historical Park. There are no National Historic Trails within the analysis area.

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 a report was prepared and submitted to the BLM.

For the Proposed Action, places of traditional religious and cultural importance (e.g., TCPs) were identified by reviewing existing published and unpublished literature (e.g. Van Valkenburgh 1941, 1974; Brugge 1993; Kelly et al. 2006), and the site-specific Class III survey report prepared for the Proposed Action. In addition, the BLM's cultural resources program was contacted for information regarding the presence of places of traditional religious and cultural importance identified through ongoing BLM tribal consultation efforts.

The Class III inventory identified five cultural sites within the APE (LAC Report 2014-2xxx [LAC 2016]; BLM Report 2016(II)009F). Three of the sites are recommended eligible for nomination to the NRHP, one of the sites needs additional data to determine eligibility for nomination to the NRHP, and one of the sites is recommended not eligible for nomination to the NRHP.

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### ***3.8.2. Impacts from Proposed Action***

#### **Direct and Indirect Impacts**

The Impact Analysis Area for direct and indirect impacts is the Escavada Wash watershed and the APE. The impact indicator for analysis is the acres of surface disturbance and number of historic properties, properties listed on the National Register of Historic Places or New Mexico State Register of Cultural Properties, Chaco Protection Sites, World Heritage Sites, National Historic Trails, and other places of traditional religious and cultural importance in the analysis area.

Cultural resources tend to degrade over time from natural forces; however, many survive for hundreds or thousands of years. Any land-disturbing activity can disturb, damage, or uncover cultural resources. Direct impacts normally include alterations to the physical integrity of a historic property. If a historic property is significant for other than its information potential, direct impacts may also include the introduction of audible, atmospheric, or visual elements that are out of character for the property. A potential indirect impact from the Proposed Action, particularly in undeveloped areas is the increase in human activity or access to the area with an increased potential of unauthorized damage to historic properties.

Historic properties or other places of traditional religious and cultural importance in the APE 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 BLM Cultural Resource Record of Review attached to the COA in the APD/ROW/Sundry as the case may be. Chaco Culture National Historical Park and Bis sani are >10 miles from the Proposed Action. Based on GIS analysis the Proposed Action lies in the middle ground view shed of the CCNHP designated KOP of Pueblo Alto but at approximately 15 miles will not be visible. The Proposed Action will have no direct or

indirect impact on historic properties or other places of traditional religious and cultural importance in the APE and impact analysis area (no historic properties affected).

Cultural resources “discoveries” and risks of impacting unknown (i.e., buried) historic properties during surface disturbing components of a proposed action are infrequent in the 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 ac of land were inspected for cultural resources, with an average of 7.2 ac per action and one discovery per 5,472 ac. All authorizations (e.g., APDs, R-O-Ws) have stipulations, under penalty of law, require 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.,  $\leq 100'$  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.

## Cumulative Impacts

The analysis area and impact indicator for cumulative impacts is the same as for direct and indirect impacts. Past, present, and reasonably foreseeable future actions within the analysis area that may also risk impacting historic properties, properties listed on the National Register of Historic Places or New Mexico State Register of Cultural Properties, Chaco Protection Sites, World Heritage Sites, National Historic Trails, or other places of traditional religious and cultural importance from surface disturbance include the following:

- Oil and gas development, including associated roads and pipelines

105 oil and gas wells have been developed in the Escavada Wash watershed. These wells have resulted in 78.8 acres of surface disturbance. Based on the RFD (Engler, et al., 2014), oil and gas development in the watershed may result in 2,135 acres of short-term. This results in a total of 2,056 acres of additional surface disturbance from oil and gas development in the watershed. The Proposed Action would contribute 18.3 acres of short-term disturbance to cumulative amount of disturbance from oil and gas development in the watershed.

The watershed has an average site density of 1:31 ac. This additional disturbance of 2074 acres would potentially intersect an additional 67 cultural sites and approximately 80% would be historic properties or other places of traditional religious and cultural importance and have the same impacts as described for direct and indirect impacts.

For the Proposed Action there will be no cumulative impact on historic properties, properties listed on the National Register of Historic Places or New Mexico State Register of Cultural Properties, Chaco Protection Sites, World Heritage Sites, National Historic Trails, or other places of traditional religious and cultural importance, if present, as they are being avoided. Reasonably foreseeable future actions will also avoid historic properties.

On average, 7.2 acres have been culturally inventoried per oil and gas project component (i.e., well pad, access road, pipeline) in the FFO since 2000. 105 oil and gas projects have occurred in the watershed for a total of 2,310 inventoried acres. An additional 221 oil and gas projects are presently being developed or reasonably foreseeable based on the 2014 RFD. These projects could result in 4,862 acres of additional cultural survey. Approximately one cultural resource discovery is anticipated to occur for all additional oil and gas projects in the watershed and have the same impacts as described for direct and indirect impacts.

## 3.9. Livestock Grazing

### 3.9.1. Affected Environment

The proposed project is located in the Kimbeto Community Allotment (Allotment No. 6013). Vegetation in the allotment is predominately in the sagebrush shrubland and piñon-juniper woodland vegetation

communities. The Kimbeto Community Allotment has a grazing authorization permitting 324 cattle, 15 horses, and 1,554 sheep with year-round grazing periods. The term grazing authorization permits the utilization of active AUMs of forage for each type of livestock, as presented in Table 18. An AUM is the amount of forage needed to sustain a cow (1,000 pounds) or cow/calf pair for 1 month. The Kimbeto Community Allotment is 103,498 acres and consists of 100% BLM-authorized AUMs.

**Table 18. Animal Unit Months and Rangeland Carrying Capacity for Kimbeto Community Allotment**

Type of Livestock	AUMs of Forage	Rangeland Carrying Capacity for Allotment (acres/AUM)
Cattle	2,931	35.3
Horses	162	638.9
Sheep	3,220	32.1

No existing range improvements are present within the proposed project area.

### 3.9.2. Impacts from Proposed Action

#### Direct and Indirect Impacts

Forage removal within the Kimbeto Community Allotment would be the primary impact to livestock grazing resources. The proposed project would result in new surface disturbance of 9.7 acres within the allotment, of which 2.3 acres would be long-term disturbance. The estimated short-term and long-term impacts to rangeland carrying capacity is provided in Table 19.

**Table 19. Estimated Impacts to Rangeland Carrying Capacity within Kimbeto Community Allotment from Proposed Project**

Type of Livestock	Short-Term Impact <sup>1</sup> (AUMs)	Long-Term Impact <sup>2</sup> (AUMs)
Cattle	0.3	0.1
Horses	Less than 0.1	Less than 0.1
Sheep	0.3	0.1

<sup>1</sup> Assumes 35.3 acres per AUM for cattle, 638.9 acres per AUM for horses, and 32.1 acres per AUM for sheep and a short-term disturbance of 9.7 acres.

<sup>2</sup> Assumes 35.3 acres per AUM for cattle, 638.9 acres per AUM for horses, and 32.1 acres per AUM for sheep and a short-term disturbance of 2.3 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. Livestock injuries could occur when they fall into or try to get out of a ditch-type cavity. 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 project (see Section 2.2.3) identify measures to prevent these types of impacts.

#### Cumulative Impacts

The analysis area (grazing allotment) 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 103,498-acre analysis area (Kimbeto Community Allotment [6013]) include approximately 42.8 acres surface disturbance, including past construction of 57 oil and gas well pads and associated roads and pipelines. Past actions account for surface disturbance and vegetation removal on approximately 0.04% 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 717.3 acres (0.69% of the analysis area) of additional surface disturbance and 164.3 acres (0.16% 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 proposed project area. Generally, native vegetation loss and potential spread of noxious weeds and invasive species would be expected to occur, especially during construction of the future action. The proposed project 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 9.7 acres of short-term surface disturbance and 2.3 acres of long-term surface disturbance to the past, present, and reasonably foreseeable actions calculated above (Less than 0.1% of Allotment No. 6013 for livestock grazing). Together, the cumulative surface disturbance would total 769.8 acres (0.74% of Allotment No. 6013 for livestock grazing) of short-term surface disturbance and 209.4 acres (0.20% of Allotment No. 6013) of long-term surface disturbance within the analysis area.

### 3.10. Social and Economic Features/Environmental Justice

#### 3.10.1. Affected Environment

##### Social and Economic Features

The proposed project is located in San Juan County, New Mexico. According to the 2014 U.S. Census estimate, New Mexico had a population of 2,085,572 with 123,785 persons residing in San Juan County (down from 130,044 persons in 2010). San Juan County, considered rural in character, is approximately 5,513 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 (U.S. Census Bureau 2015a).

From 2010 to 2014, San Juan County had a median household income of \$48,824 and a per capita personal income of \$27,789. This 2014 per capita personal income figure was 86.3% of the national average per capita income, which was \$32,191 and 98.8% of the average per capita income for New Mexico, which was \$28,122 (U.S. Census Bureau 2014a).

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/community to the proposed project with census data is Bloomfield (approximately 33 miles away) and Nageezi, New Mexico (approximately 2 miles away). The population and incomes associated with Bloomfield and Nageezi are provided in Table 20.

**Table 20. Bloomfield and Nageezi Population and Income Data**

Town/Community	Estimated Population	Median Household Income from 2010 to 2014	Average Per Capita Income from 2010 to 2014
Bloomfield	7,638	\$44,657	\$31,731
Nageezi	286	\$14,485	\$9,412

Sources: U.S. Census Bureau 2014a

##### 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 2014, poverty level is based on total income of \$12,071 for an individual and \$24,008 for a family of four (U.S. Census Bureau 2015b). 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 Bureau’s Model-Based Small Area Income & Poverty Estimates for School Districts, Counties, and States indicate that poverty levels ranged from 12.6% in Sandoval County to 35.8% in McKinley County. Only that of Sandoval County was below the state average. Estimates from 2014 indicate that Sandoval County (\$56,142) and San Juan County (\$47,520) had household median incomes that were above the state level (\$44,905). McKinley County (\$29,497) and Rio Arriba County (\$34,902) household incomes were below the state level. Sandoval County was the only county above the United States household income level (\$53,657) (U.S. Census Bureau 2014b). The poverty data within the socioeconomic study area are provided in Table 21.

**Table 21. Study Area County Population in Poverty**

	Study Area				New Mexico	United States
	McKinley County	Rio Arriba County	Sandoval County	San Juan County		
Population in poverty	26,327	9,503	17,264	25,680	420,388	48,208,387
	35.8%	24.1%	12.6%	21.0%	20.6%	15.5%
Median household income	\$29,497	\$34,902	\$56,142	\$47,520	\$44,905	\$53,657
Classified as low income population in 2014 based on CEQ guidelines?	No	No	No	No	NA	NA

Source: U.S. Census Bureau 2014b.

Five of the communities (Bernalillo, Bloomfield, Farmington, Gallup, and Nageezi) within the socioeconomic study area are classified as minority populations under the CEQ definition (Table 22). One

community (Nageezi) meets the CEQ definition of a low-income population area (50% or higher). The highest poverty rates were seen in Bernalillo (22.8%), Bloomfield (24.5%), Gallup (24.1%), and Nageezi (54.6%). The race/ethnicity and poverty data for key communities within the socioeconomic study area are provided in Table 22.

**Table 22. Study Area Key Community Race/Ethnicity and Poverty Data**

Community	% Population Racial or Ethnic Minority	Classified as Minority Population based on CEQ?	Percent of Individuals Below Poverty	Classified as Low-income Population based on CEQ?
Aztec	34.0%	No	15.2%	No
Bernalillo	76.5%	Yes	22.8%	No
Bloomfield	62.3%	Yes	24.5%	No
Farmington	50.3%	Yes	18.0%	No
Gallup	76.3%	Yes	24.1%	No
Nageezi	95.6%	Yes	54.6%	Yes
Rio Rancho	47.9%	No	11.3%	No

Source: U.S. Census Bureau 2014a.

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 2010 and 2014. The estimates 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 Tract 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 2012). These three Census Tracts are all relatively large, indicating a sparsely populated, rural area.

The proposed project is located 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. Estimates from 2014 indicate that this census tract had a household median income of \$34,103, which is below the state level of \$44,905 (U.S. Census Bureau 2014a) but above the poverty level of \$24,008 (U.S. Census Bureau 2015b). Census Tract 9432.01 had an individual poverty rating of 36.5% (U.S. Census Bureau 2014a).

The Proposed Action is primarily located within an area of developed and undeveloped rural land in southeastern San Juan County. The proposed project is located approximately 2 miles southwest of the community of Nageezi, a census-designated place along U.S. Highway 550. In 2014, the individual poverty rate was 54.6% for a population of 286 (U.S. Census Bureau 2014a), substantially higher than the San Juan County average at 21.0% (U.S. Census Bureau 2014b). This low-income population meets the CEQ definition of a low-income population area.

### **Minority Populations**

Based on 2010–2014 data, minorities made up 60.4% of the population in New Mexico, compared to 37.2% in the United States. The proportion of minorities in the socioeconomic study area exceeds the United States and state averages, with the population ranging from 53.9% minority in Sandoval County to 89.9% in McKinley County. Within the study area, the largest minority groups were American Indian or Alaskan Native in McKinley County, Hispanic or Latino in Rio Arriba County, Hispanic or Latino and White for Sandoval County, and White and American Indian or Alaskan Native in San Juan County. Within

relevant tribal nations, Native Americans represented the vast majority of the population (U.S. Census Bureau 2014a). The race/ethnicity data within the socioeconomic study area are provided in Table 23. Additionally, based on the CEQ definition of a minority population area (minority residents exceed 50% of all residents), Bernalillo, Bloomfield, Farmington, Gallup, and Nageezi are considered minority communities (Table 22).

**Table 23. Study Area County Population by Race/Ethnicity (2010–2014)**

Population	Study Area Counties				New Mexico	United States	Jicarilla Apache Nation	Navajo Nation	Ute Mountain Ute Tribe
	McKinley	Rio Arriba	Sandoval	San Juan					
One race	70,748	39,365	130,390	123,095	2,014,988	304,981,333	2,994	173,136	1,513
	96.8%	98.0%	96.4%	96.7%	96.9%	97.1%	96.8%	98.7%	95.8%
Hispanic or Latino ethnicity of any race	10,083	28,676	49,157	24,659	978,189	53,070,096	319	3,387	87
	13.8%	71.4%	36.4%	19.4%	47.0%	16.9%	10.3%	1.9%	5.5%
White alone	7,407	5,273	62,387	52,636	824,291	197,159,492	55	3,602	71
	10.1%	13.1%	46.1%	41.3%	39.6%	62.8%	1.8%	2.1%	4.5%
Black or African American alone	428	158	2,672	620	37,519	38,460,598	15	581	5
	0.6%	0.4%	2.0%	0.5%	1.8%	12.2%	0.5%	0.3%	0.3%
American Indian or Alaskan Native alone	53,221	5,631	16,097	46,326	177,555	2,082,768	2,579	164,688	1,378
	72.8%	14.0%	11.9%	36.4%	8.5%	0.7%	83.4%	93.9%	87.3%
Asian alone	652	192	1,824	463	26,991	15,536,209	53	952	4
	0.9%	0.5%	1.3%	0.4%	1.3%	4.9%	1.7%	0.5%	0.3%
Native Hawaiian and other Pacific Islander alone	50	2	63	70	942	493,155	0	341	0
	0.1%	<0.1%	<0.1%	0.1%	<0.1%	0.2%	0.0%	0.2%	0.0%
Some other race alone	8	31	475	90	3,718	611,881	4	23	0
	<0.1%	0.1%	0.4%	0.1%	0.2%	0.2%	0.1%	<0.1%	0.0%
Two or more races	1,233	192	2,516	2,494	30,880	6,692,885	67	1,888	34
	1.7%	0.5%	1.9%	2.0%	1.5%	2.1%	2.2%	1.1%	2.2%
Classified as minority population based on CEQ guidelines?	Yes (89.9%)	Yes (86.9%)	Yes (53.9%)	Yes (58.7%)	Yes (60.4%)	NA (37.2%)	Yes (98.2%)	Yes (97.9%)	Yes (95.5%)

Source: U.S. Census Bureau 2014a.

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 2010 and 2014. The estimates do not represent a single point in time.

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 2012). 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 23 account for a portion of the Native American population study area, notably McKinley and San Juan Counties, where the population is 72.8% and 36.4% American Indian or Alaskan Native, respectively (U.S. Census Bureau 2014a). Three tribal governments have reservations within the BLM

FFO planning area: the Jicarilla Apache Nation, the Navajo Nation, and the Ute Mountain Ute Tribe (Table 24). The Southern Ute Indian Tribe has lands just north of the BLM FFO planning area in the state of Colorado but no lands within the BLM FFO planning area. Almost one-half of the BLM FFO 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 24. Tribal Nations in the BLM FFO 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.
Ute Mountain Ute Tribe	103,500	A portion of the Ute Mountain Ute Tribe 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 are located in the southern portion of the planning area.

Source: BLM 2015, U.S. Census Bureau 2015c

The Proposed Action is located in an area characterized by discontinuous parcels of Navajo Nation trust and allotted lands. The nearby census-designated place of Nageezi had a population of 286 in 2014, with 94.2% of the population being American Indian and Alaska Native (U.S. Census Bureau 2014a).

Overall, Census Tract 9432.01 is considered to have a minority population greater than 50%, with 78.9% of its population identifying as American Indian or Alaskan Native (U.S. Census Bureau 2014a). 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.

### **3.10.2. 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 area. 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 project is 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 area. 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 project, 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 oil and natural gas used for heating and other energy needs at the local, state, and regional level in the greater southwestern United States. In 2014, the oil and gas industry operating on BLM-managed lands within New Mexico had a direct economic output of \$13.1 billion (BLM 2015). 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 project qualifies as an environmental justice population. This population would not be directly affected by the proposed project because the community of Nageezi is at least 2 miles northeast of the proposed surface disturbance areas. However, this community 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 project 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.

## **3.11. Public Health and Safety**

### ***3.11.1. 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 must 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 area is fairly remote and is located in an area with established oil and gas exploration, development, and transportation. The nearest town/community, Nageezi (population 286 [U.S. Census Bureau 2014a]), is approximately 2 miles northeast of the proposed project. U.S. Highway 550 is located approximately 2 miles east-northeast of the proposed project. There are no designated recreation areas, commercial areas, or residential areas within 1 mile of the proposed project area.

The nearest hospital is in Farmington. This hospital is approximately 41 air miles or approximately 51 road miles northwest of the proposed well pad.

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.

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### **3.11.2. 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, proposed facilities would have informational signs, as directed under 43 CFR 3160.

During the proposed construction, drilling, completion, and maintenance phases of the proposed project, 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.

The proposed project would affect transportation. During the construction phases, the proposed project 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 area. The increased use of dirt access roads during muddy conditions would worsen the roads' conditions. BMPs to control fugitive dust are incorporated into the project design features found in Section 2.2.3.

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 project, physical hazards would be present. The design features and BMPs for the proposed project (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 25 contains a list of tribes, individuals, organizations, and agencies invited to attend the pre-disturbance on-site meetings for the proposed project.

**Table 25. Tribes, Individuals, Organizations, and Agencies Invited to the On-Site Meetings**

Name	Tribe, Organization, or Agency	Attended On-Site
--	Nageezi Chapter House	No
Colleen Cooley	Dine Care	No
Thomas Singer	Western Environmental Law Center	No
Mike Eisenfeld	San Juan Citizens Alliance	No
Sarah White	--	No
Erik Schlenker-Goodrich	Western Environmental Law Center	No
Kyle Tisdale	Western Environmental Law Center	No
Samantha Ruscavage-Barz	WildEarth Guardians	No
Tim Ream	WildEarth Guardians	No
Pete Dronkers	Earthworks	No
Jermy Nichols	WildEarth Guardians	No
Anson Wright	Chaco Alliance	No
Bruce Baizel	Earthworks	No
Tweetie Blancett	--	No
Lori Goodman	Dine Care	No
Samuel Sage	Counselor Chapter	No
Don Schrieber	Devil Springs Ranch	No
Miya King-Flaherty	Sierra Club	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, 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 Advisory Council on Historic Preservation, 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 and 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 26 contains a list of individuals that contributed to or reviewed this EA.

**Table 26. List of EA Preparers**

Name	Area of Expertise	Organization
Marcella Martinez	Planning and Environmental Specialist	BLM
Neil Perry	Wildlife Biologist	
Jeff Tafoya	Supervisor Multiple Resources	
Jim Copeland	Archaeologist	
John Kendall	Wildlife Biologist T&E	
Heather Perry	NRS Weeds Program Coordinator	
Craig Willems	Environmental Protection Specialist	
Michael Porter	Natural Resources Specialist	
Katie Wegner	Regulatory Analyst	
Deb Silverman	Archaeological Consultant	
Paul Stirniman	Archaeological Consultant	
Steven Fuller	Archaeological Consultant	
Amber Ballman	Natural Resources Project Manager	SWCA
Ariel Perraglio	Biologist	SWCA
Annie Lutes	NEPA Writer	
Deb Reber	NEPA Reviewer	
Eilene Lyon	Biologist/Botanist	
Eric Creeden	GIS Specialist/Biologist	

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# APPENDIX A. BIOLOGICAL SURVEY REPORT

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## APPENDIX B. PHOTOGRAPHS

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**Figure B.1. View from wellheads facing north.**



**Figure B.2. View from wellheads facing south.**



**Figure B.3. View from wellheads facing east.**



**Figure B.4. View from wellheads facing west.**



**Figure B.5. View from end of new access road (STA 21+73) facing north.**



**Figure B.6. View from the northwestern corner of the staging area (new access road STA 8+32) facing south.**

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## APPENDIX C. SURVEY PLATS

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**DISTRICT I**  
1625 E French Dr., Hobbs, NM 88240  
Phone: (505) 393-6181 Fax: (505) 393-0720

**DISTRICT II**  
611 S First St., Artesia, NM 88210  
Phone: (505) 748-1293 Fax: (505) 748-0720

**DISTRICT III**  
1000 Rio Hondo Rd., Artesia, NM 87410  
Phone: (505) 334-6179 Fax: (505) 334-6179

**DISTRICT IV**  
1220 S. St. Francis Dr., Santa Fe, NM 87505  
Phone: (505) 478-3460 Fax: (505) 478-3462

State of New Mexico  
Energy, Minerals & Natural Resources Department

Form C-102  
Revised August 1, 2011

Submit one copy to appropriate  
District Office

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

<sup>1</sup> API Number	<sup>2</sup> Pool Code 98080	<sup>3</sup> Pool Name NAGEEZI UNIT HZ (OIL)
<sup>4</sup> Property Code	<sup>5</sup> Property Name NAGEEZI UNIT	<sup>6</sup> Well Number 513H
<sup>7</sup> GRID No. 282327	<sup>8</sup> Operator Name ENCANA OIL & GAS (USA) INC.	<sup>9</sup> Elevation 6802'

<sup>10</sup> Surface Location

UL or lot no.	Section	Township	Range	Lot Lth	Feet from the	North/South line	Feet from the	WEST/West line	County
P	9	23N	9W		1271'	SOUTH	825'	EAST	SAN JUAN

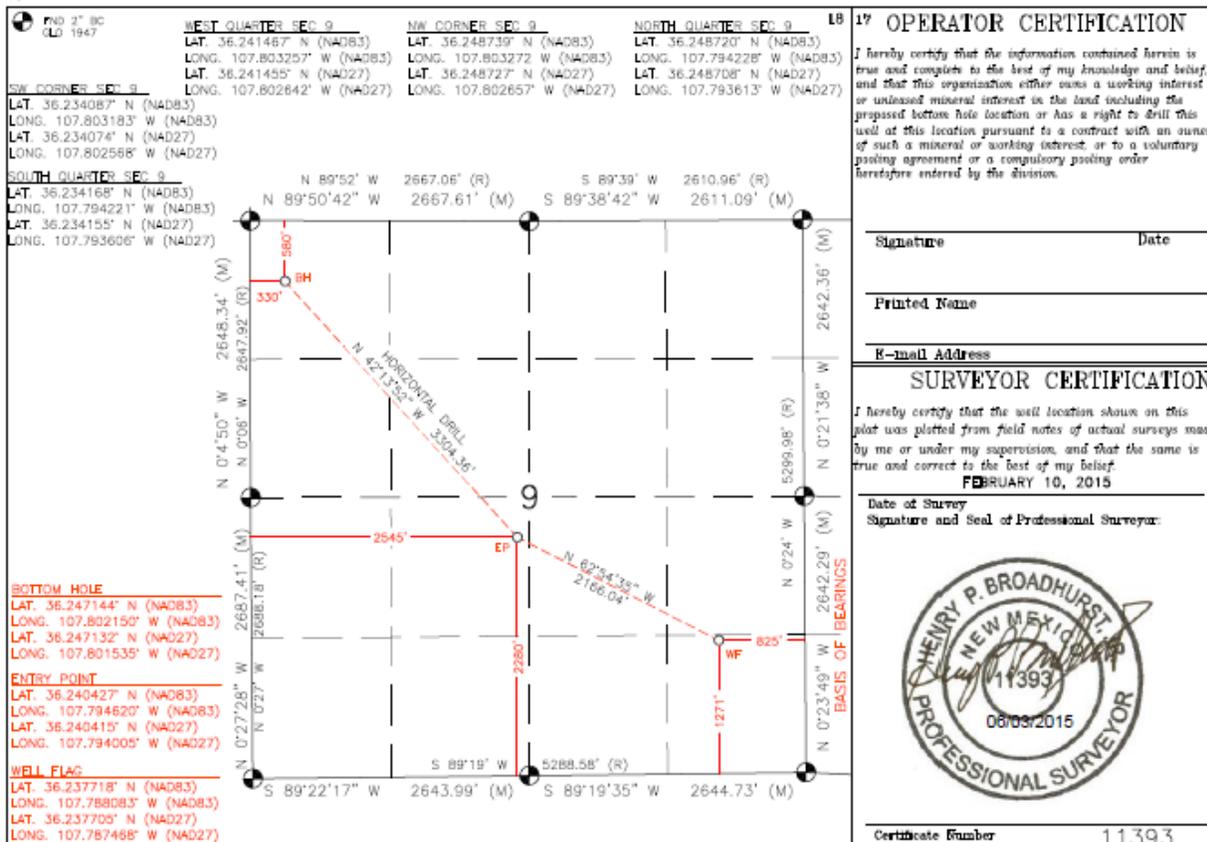
<sup>11</sup> Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Lth	Feet from the	North/South line	Feet from the	WEST/West line	County
D	9	23N	9W		580'	NORTH	330'	WEST	SAN JUAN

<sup>12</sup> Dedicated Acres PROJECT AREA 9,135.51 ACRES SEC. 21-23 (S/2) 28-28, 33-35, 1-4, 9-10 (ALL); 5 (W/2); 11 (NW/4) - UNDIVIDED UNIT; PENETRATED SPACING UNIT; ALL SEC. 9	<sup>13</sup> Joint or Infill	<sup>14</sup> Consolidation Code	<sup>15</sup> Order No. R-13856 (9,135.51 ACRES)
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NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED  
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

16



**DISTRICT I**  
1825 E. French Dr., Hobbs, NM 88240  
Phone: (575) 393-6181 Fax: (575) 393-0720

**DISTRICT II**  
311 S. First St., Artesia, NM 88210  
Phone: (575) 748-1833 Fax: (575) 748-0720

**DISTRICT III**  
1000 Rio Pecos Rd., Artesia, NM 87410  
Phone: (505) 334-6179 Fax: (505) 334-6170

**DISTRICT IV**  
1220 S. St. Francis Dr., Santa Fe, NM 87505  
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico  
Energy, Minerals & Natural Resources Department

Form C-102  
Revised August 1, 2011

Submit one copy to appropriate  
District Office

**OIL CONSERVATION DIVISION**  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

AMENDED REPORT

**WELL LOCATION AND ACREAGE DEDICATION PLAT**

<sup>1</sup> API Number	<sup>2</sup> Pool Code 98080	<sup>3</sup> Pool Name NAGEEZI UNIT HZ (OIL)
<sup>4</sup> Property Code	<sup>5</sup> Property Name NAGEEZI UNIT	<sup>6</sup> Well Number 514H
<sup>7</sup> OGHD No. 282327	<sup>8</sup> Operator Name ENCANA OIL & GAS (USA) INC.	<sup>9</sup> Elevation 6802'

<sup>10</sup> Surface Location

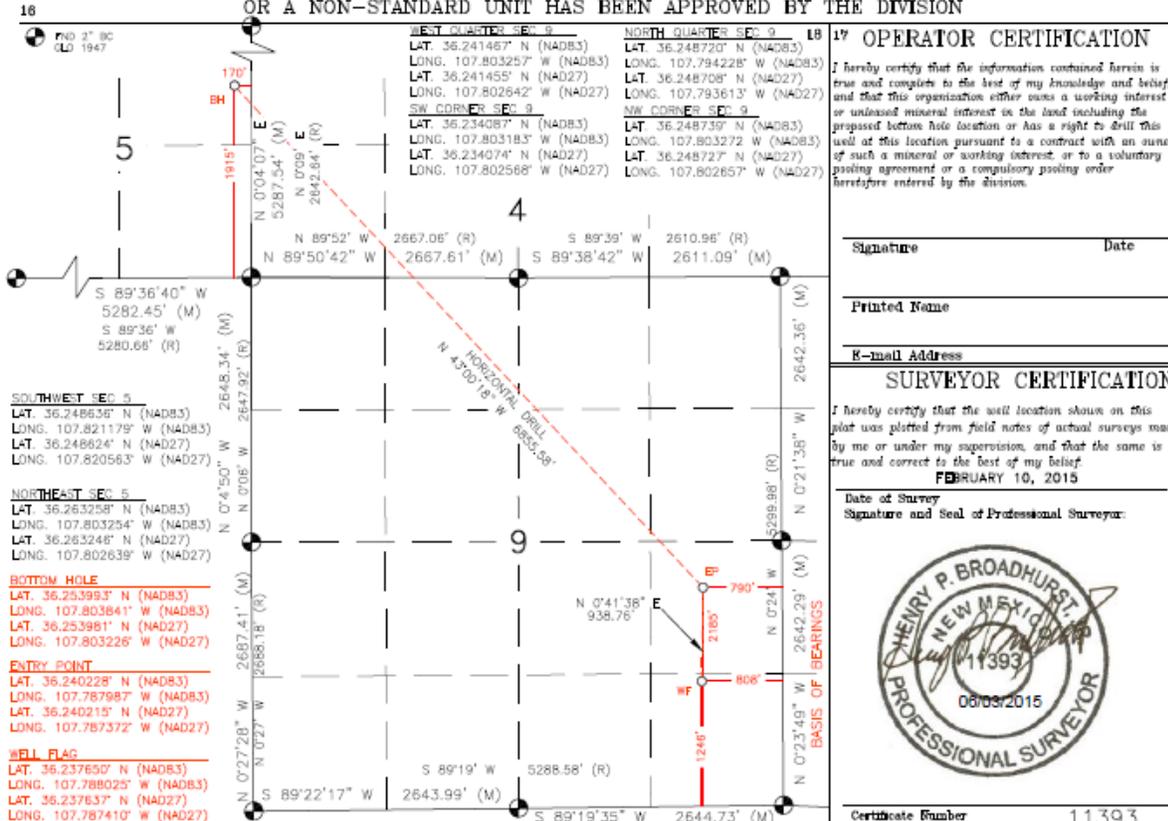
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	WEST/West line	County
P	9	23N	9W		1246'	SOUTH	808'	EAST	SAN JUAN

<sup>11</sup> Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	WEST/West line	County
I	5	23N	9W		1915'	SOUTH	170'	EAST	SAN JUAN

<sup>12</sup> Dedicated Acres 9,135.51 ACRES SEC. 21-23 (5/2); 26-28, 33-35, -4, 9-10 (ALL) 5 (W/2) 11 (SW/4) - UNBLENDED UNIT; FENCED SPACING UNIT: E/2 SE/4 SEC. 5, W/2 SW/4 SEC. 4 & ALL SEC. 3	<sup>13</sup> Joint or Infill	<sup>14</sup> Consolidation Code	<sup>15</sup> Order No. R-13856 (9,135.51 ACRES)
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**NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION**



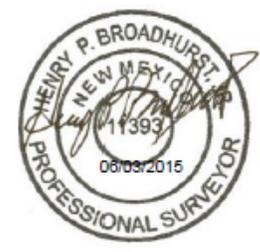
**17 OPERATOR CERTIFICATION**  
I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or undivided mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the Division.

Signature \_\_\_\_\_ Date \_\_\_\_\_  
Printed Name \_\_\_\_\_  
E-mail Address \_\_\_\_\_

**SURVEYOR CERTIFICATION**

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

**FEBRUARY 10, 2015**  
Date of Survey  
Signature and Seal of Professional Surveyor:



Certificate Number 11393

**DISTRICT I**  
1625 E. French Dr., Hobbs, NM 88240  
Phone: (575) 393-0361 Fax: (575) 393-0720

**DISTRICT II**  
511 S. First St., Arteson, NM 88210  
Phone: (575) 748-1293 Fax: (575) 748-0720

**DISTRICT III**  
1000 Rio Brazos Rd., Arteson, NM 87410  
Phone: (505) 334-0378 Fax: (505) 334-0170

**DISTRICT IV**  
1220 S. St. Francis Dr., Santa Fe, NM 87505  
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico  
Energy, Minerals & Natural Resources Department

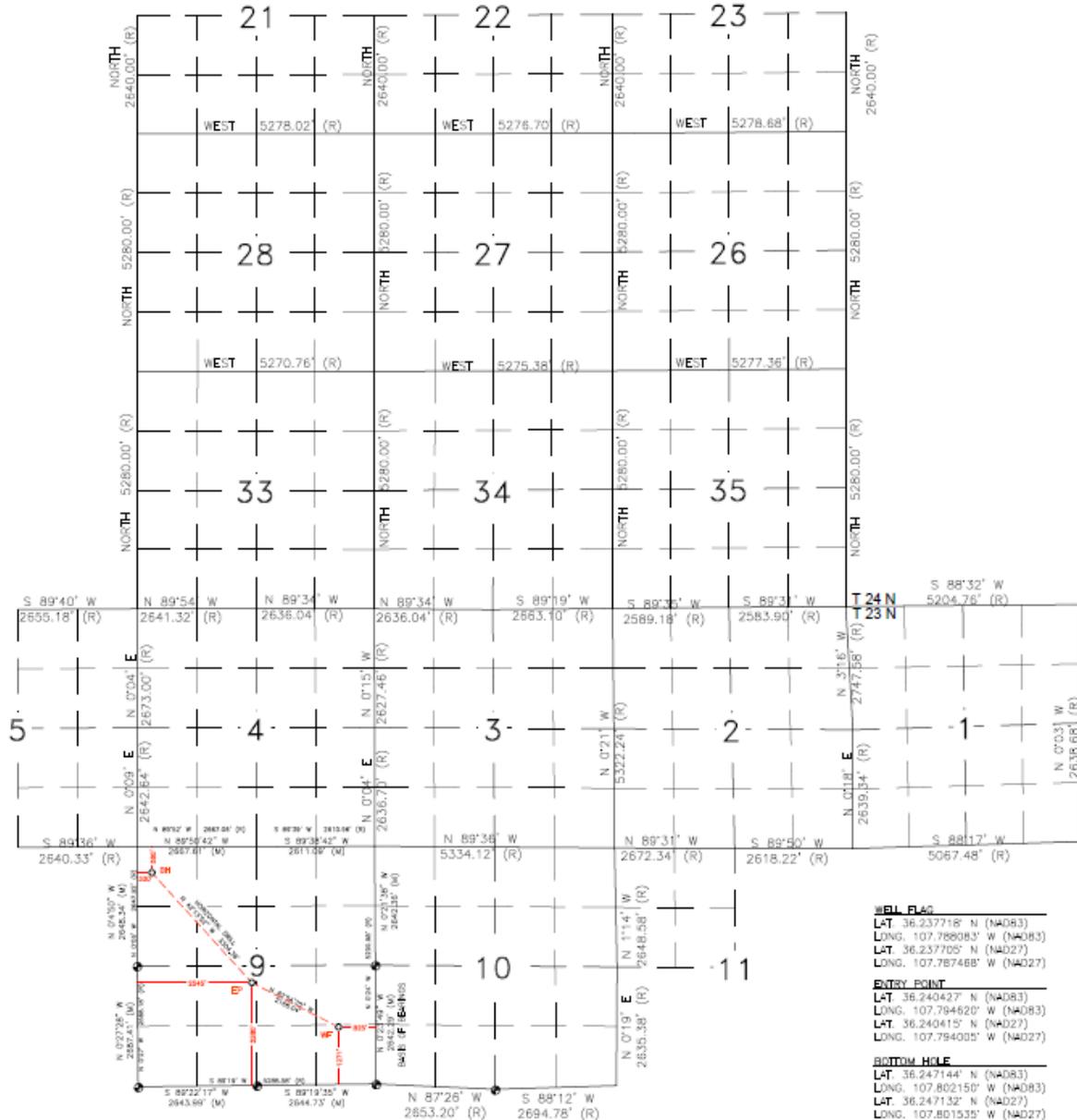
Form C-102  
Revised August 1, 2011

Submit one copy to appropriate  
District Office

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

AMENDED REPORT

ENCANA OIL & GAS (USA) INC.  
NAGEEZI UNIT #513H



**WELL FLAG**  
 LATITUDE: 36.237718° N  
 LONGITUDE: 107.798083° W  
 DATUM: NAD83  
 NOW OR FORMERLY OWNED BY  
 THE BUREAU OF LAND MANAGEMENT

**ENCANA OIL & GAS (USA) INC.**  
**NAGEEZI UNIT #513H**  
 1271' FSL & 825' FEL  
 LOCATED IN THE SE/4 SE/4 OF SECTION 9  
 T23N, R9W, N.M.P.M.,  
 SAN JUAN COUNTY, NEW MEXICO  
 GROUND ELEVATION: 6802', NAVD 88  
 FINISHED PAD ELEVATION: 6803.4', NAVD 88

**NOTES:**

1. LOCATION OF SURFACE OWNERSHIP (BUREAU OF LAND MANAGEMENT) AND THE EAST QUARTER CORNER OF SECTION 9, TOWNSHIP 23 NORTH, RANGE 9 WEST, MERIDIAN 9 WEST, SAN JUAN COUNTY, NEW MEXICO. SAN JUAN COUNTY BEARS N 02°32'40" W A DISTANCE OF 7042.29' BEET AS MEASURED BY GPS.

2. LATITUDE, LONGITUDE AND QUADRANTAL BEARING SHOWN ON ATRC CORNER FILE BEARING SHOWN ARE GROUND SURFACE ELEVATIONS USING A TRIMBLE LEVITATOR CONTROL POINT FROM A TRIMBLE BULLSEYE SURFACE ELEVATION AS MEASURED BY GPS.

3. LOCATION OF UNDERGROUND UTILITIES IDENTIFIED ARE APPROXIMATE PRIOR TO CONSTRUCTION OF UNDERGROUND UTILITIES. CONSTRUCTION OF UNDERGROUND UTILITIES SHALL BE TO THE HULL BEING CONSTRUCTED WITH NEW SERVICE LINES FROM THE CONSTRUCTION.

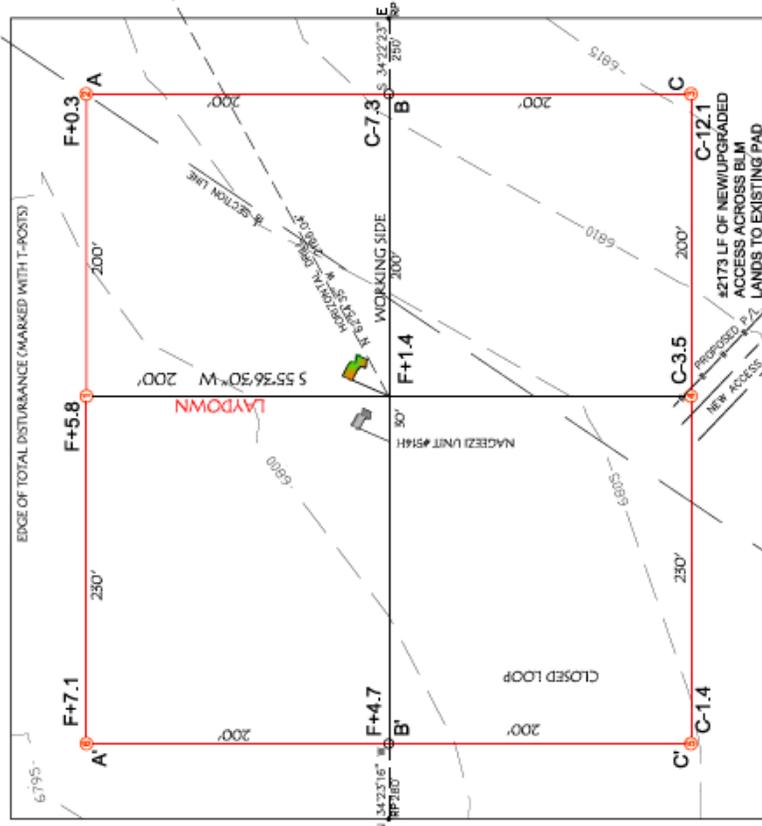
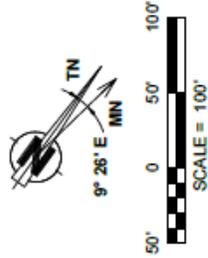
4. PROPERTY LINE BEARING SHOWN ON THE EDGE OF THE PAD IS THE EDGE OF THE PAD. THE PROPERTY LINE BEARING SHOWN ARE 50' OFFSETS FROM THE EDGE OF THE STATED WELL PAD.

~ SURFACE OWNERSHIP ~
BLM LANDS

**TOTAL PERMITTED AREA**  
 500' x 530' = 6.08 ACRES  
 SCALE: 1" = 100'



**JOB No.:** ENC345  
**DATE:** 04/14/2015  
**DRAWN BY:** TWT



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

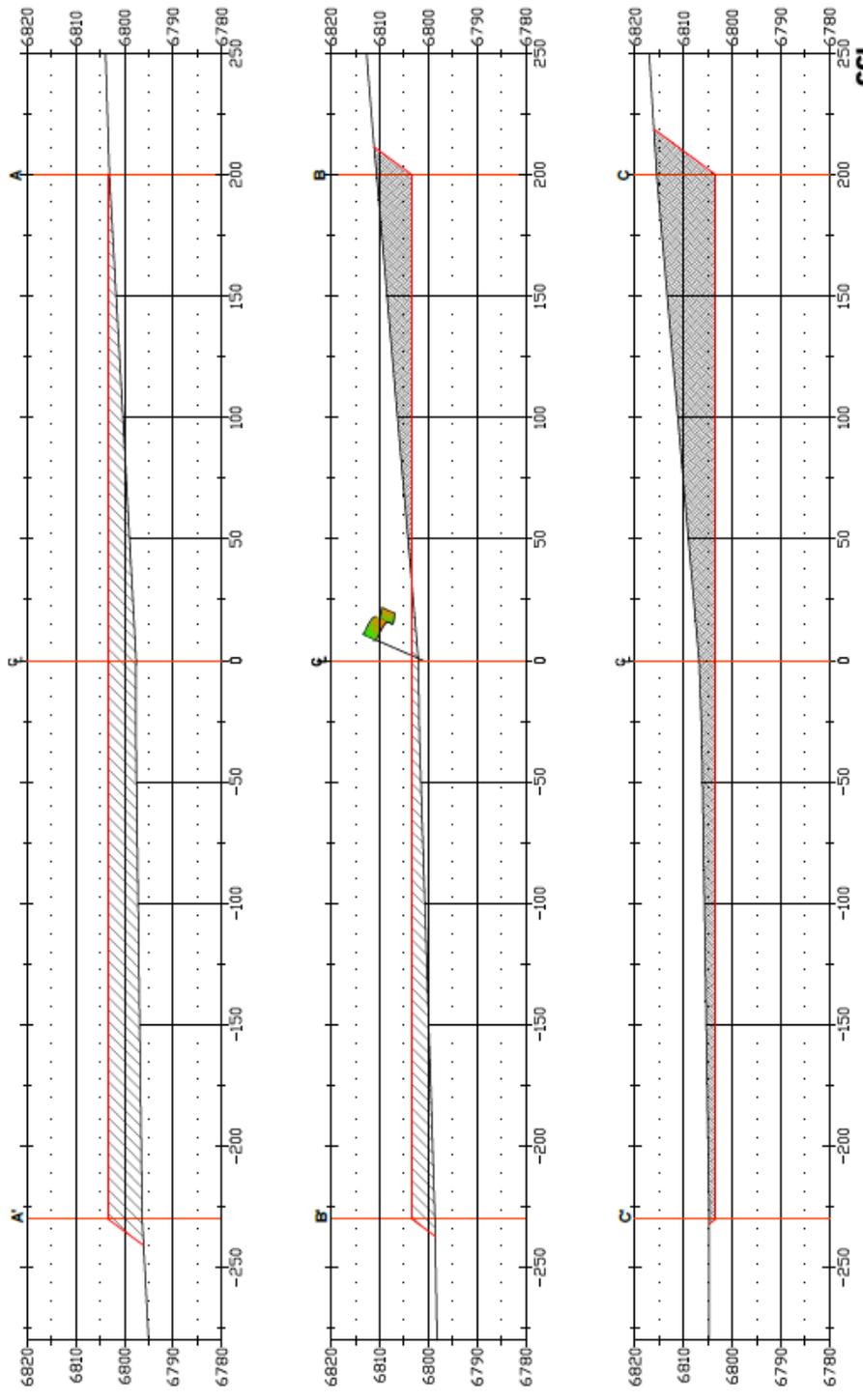
**CCI**  
**CHEVAULT CONSULTING INC.**  
 4000 COLLEGE BLVD.  
 FARMINGTON, NJ 07402  
 (505) 325-7707

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

**WELL FLAG**  
 LATITUDE: 36.237718° N  
 LONGITUDE: 107.788083° W  
 DATUM: NAD83

**ENCANA OIL & GAS (USA) INC.**  
**NAGEEZI UNIT #513H**  
 127'1" FSL & 825' FEL  
 LOCATED IN THE SE/4 SE/4 OF SECTION 9  
 T23N, R9W, N1M.P.M.,  
 SAN JUAN COUNTY, NEW MEXICO  
 GROUND ELEVATION: 6802', NAVD 88  
 FINISHED PAD ELEVATION: 6803.4', NAVD 88

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



**ENCANA**

VERT. SCALE: 1" = 30'  
 HORZ. SCALE: 1" = 60'  
 JOB No.: ENC345  
 DATE: 04/14/2015

**CHEMULT CONSULTING INC.**  
 4800 COLLEGE BLVD.  
 SUITE 201  
 FARMINGTON, NJ 07402  
 908-525-4700

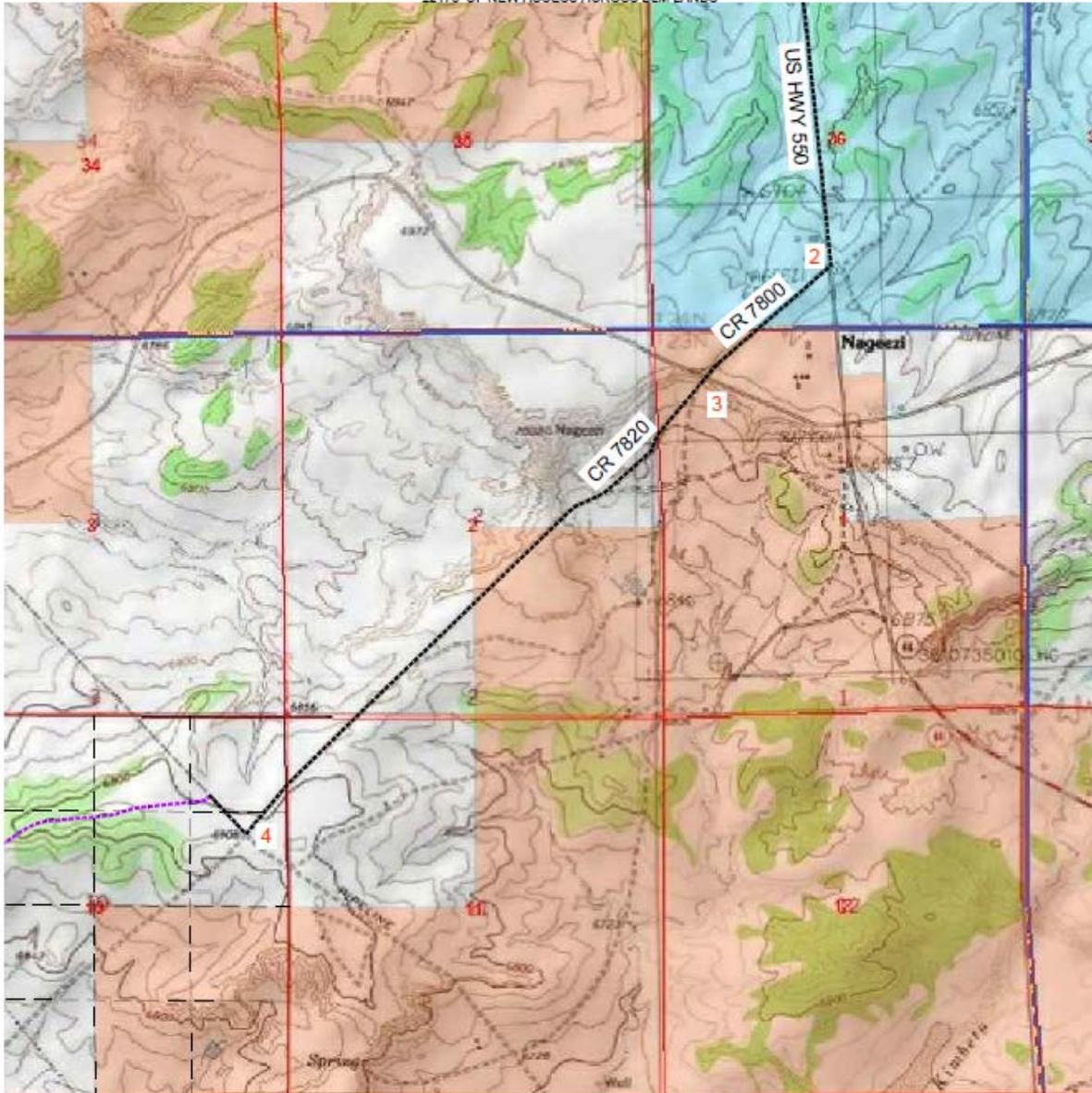
**CCI**

**FILL** **CUT**

**WELL FLAG**  
LATITUDE: 36.237718° N  
LONGITUDE: 107.788083° W  
DATUM: NAD83

**ENCANA OIL & GAS (USA) INC.**  
**NAGEEZI UNIT #513H**

1271' FSL & 825' FEL  
LOCATED IN THE SE/4 SE/4 OF SECTION 9  
T23N, R9W, N.M.P.M.,  
SAN JUAN COUNTY, NEW MEXICO  
GROUND ELEVATION: 6802', NAVD 88  
FINISHED PAD ELEVATION: 6803.4', NAVD 88  
PAGE 1 OF 2  
#2173' OF NEW ACCESS ACROSS BLM LANDS



U.S.G.S. QUAD: KIMBETO  
SCALE: 1" = 2000' (1:24,000)  
JOB No.: ENC345  
DATE: 04/15/2015



**CCI**

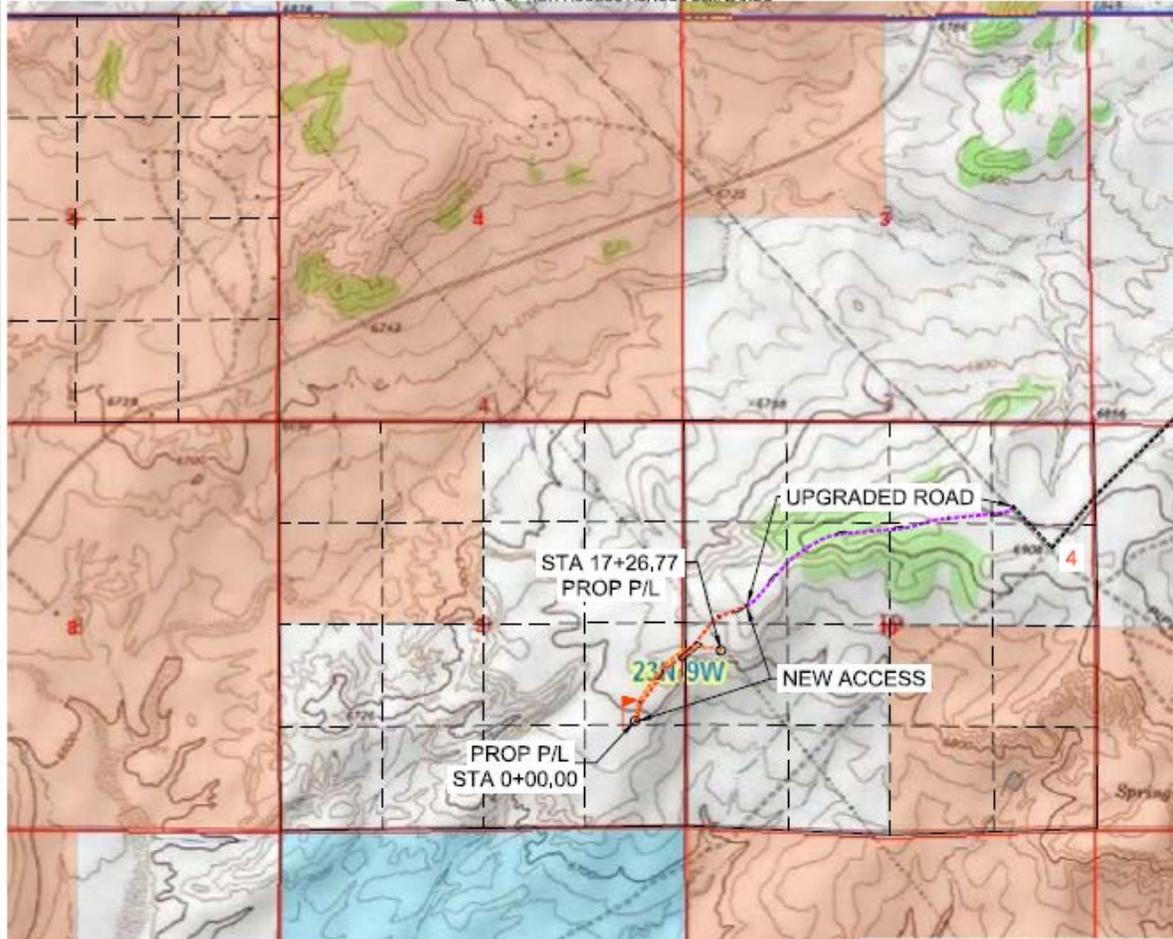
**CHENault CONSULTING INC.**

4800 COLLEGE BLVD.  
SUITE 201  
FARMINGTON, NM 87402  
(505) 325-7317

**WELL FLAG**  
 LATITUDE: 36.237718° N  
 LONGITUDE: 107.788083° W  
 DATUM: NAD83

**ENCANA OIL & GAS (USA) INC.**  
**NAGEEZI UNIT #513H**

1271' FSL & 825' FEL  
 LOCATED IN THE SE/4 SE/4 OF SECTION 9  
 T23N, R9W, N.M.P.M.,  
 SAN JUAN COUNTY, NEW MEXICO  
 GROUND ELEVATION: 6802', NAVD 88  
 FINISHED PAD ELEVATION: 6803.4', NAVD 88  
 PAGE 2 OF 2  
 ±2173' OF NEW ACCESS ACROSS BLM LANDS



**ENC-NAGEEZI UNIT #513H  
NEW ACCESS**

STA. 0+00	24" CMP
STA. 0+47.70	BEG PULLOUT
STA. 1+37.70	END PULLOUT
STA. 3+83.12	24" CMP
STA. 13+98.71	BEG PULLOUT
STA. 15+48.71	END PULLOUT
STA. 19+14.79	24" CMP
STA. 21+73.25	24" CMP

**ENC-NAGEEZI UNIT #513H  
UPGRADED ROAD**

STA. 1+60.00	BEG PULLOUT
STA. 3+00.00	24" CMP
STA. 3+10.00	END PULLOUT
STA. 8+74.00	24" CMP
STA. 14+50.00	BEG PULLOUT
STA. 16+00.00	END PULLOUT
STA. 22+00.00	BEG PULLOUT
STA. 23+50.00	END PULLOUT
STA. 32+90.00	BEG PULLOUT
STA. 34+40.00	END PULLOUT

U.S.G.S. QUAD: KIMBETO  
 SCALE: 1" = 2000' (1:24,000)  
 JOB No.: ENC345  
 DATE: 12/03/2015



**CCI**  
**CHENAULT CONSULTING INC.**  
 4900 COLLEGE BLVD.  
 SUITE 501  
 FARMINGTON, NM 87402  
 (505) 525-7707

**ENCANA OIL & GAS (USA) INC.**

**NAGEEZI UNIT #513H**

1271' FSL & 825' FEL  
LOCATED IN THE SE/4 SE/4 OF SECTION 9  
T23N, R9W, N.M.P.M.,  
SAN JUAN COUNTY, NEW MEXICO

**DIRECTIONS**

- 1) FROM THE INTERSECTION OF HWY 64 & HWY 550 IN BLOOMFIELD, GO SOUTH ON HWY 550, 36.0 MILES TO NAGEEZI.
- 2) TURN RIGHT ON CR 7800 AND GO 0.4 MILES.
- 3) CR 7800 CURVES RIGHT, HEAD STRAIGHT ONTO CR 7820 AND GO 1.7 MILES TO THE PIPELINE CORRIDOR.
- 4) TURN RIGHT AND GO 0.2 MILES TO UPGRADED ROAD ON LEFT SIDE OF ROAD. FOLLOW TO WHERE NEW ACCESS IS STAKED.

WELL FLAG LOCATED AT LAT. 36.237718° N, LONG. 107.788083° W (NAD 83).



JOB No.: ENC345  
DATE: 04/14/2015

**CCI**

**CHENAULT CONSULTING INC.**

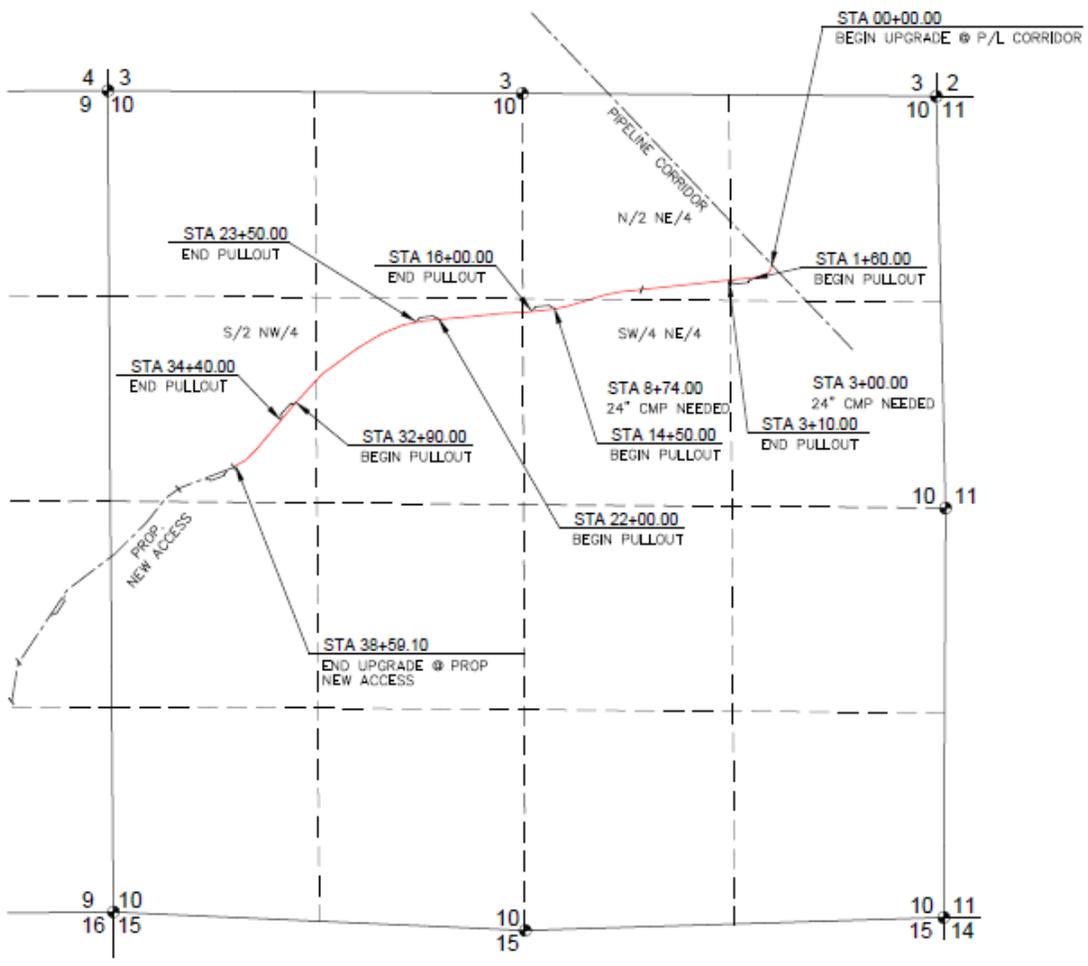
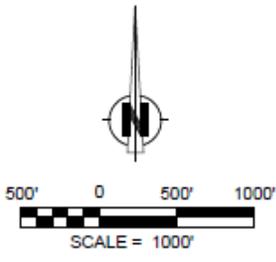
4800 COLLEGE BLVD.  
SUITE 201  
FARMINGTON, NM 87402  
(505) 325-7707



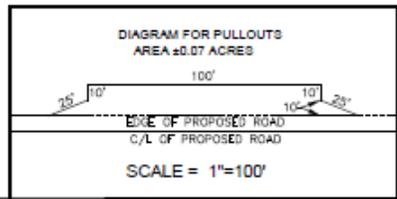


**EXHIBIT "A"**  
 UPGRADED ACCESS FOR  
**ENCANA OIL & GAS (USA) INC.**  
**NAGEEZI UNIT #513H**

LOCATED IN THE N/2 NE/4, SW/4 NE/4, & S/2 NW/4 OF  
 SECTION 10  
 T23N, R9W, N.M.P.M.,  
 SAN JUAN COUNTY, NEW MEXICO



JOB No.: ENC345  
 DATE: 04/15/2015  
 DRAWN BY: TWT

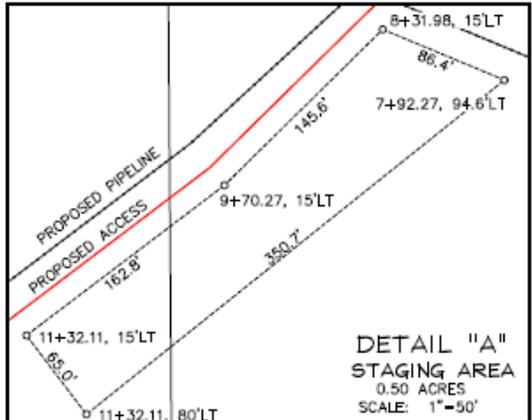
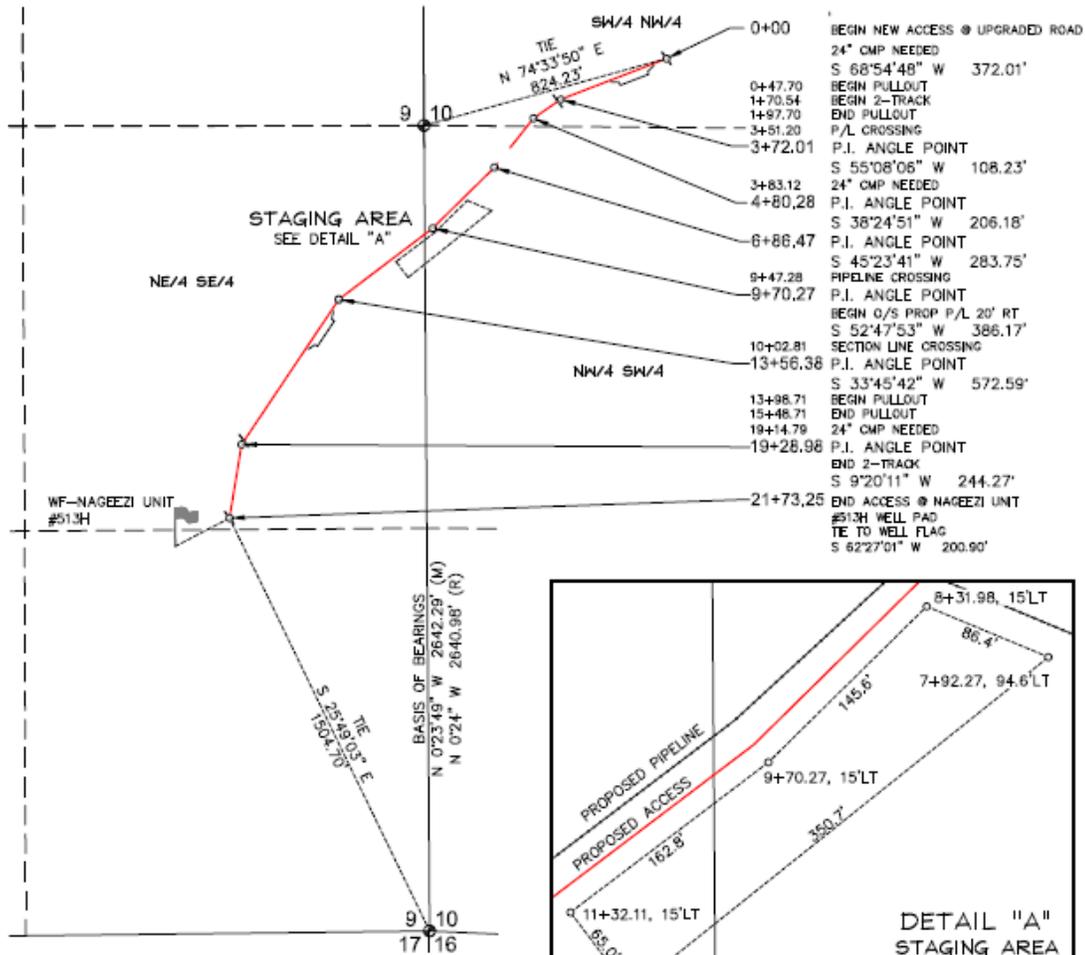
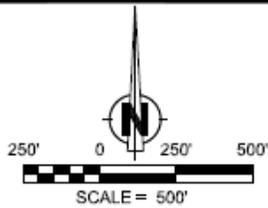


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 4800 COLLEGE BLVD.  
 SUITE 201  
 FARMINGTON, NM 87402  
 (505)-325-7707



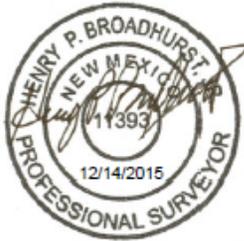
PROPOSED ACCESS FOR  
**ENCANA OIL & GAS (USA) INC.**  
**NAGEEZI UNIT #513H**

LOCATED IN THE SW/4 NW/4, NW/4 SW/4 OF SECTION 10,  
 NE/4 SE/4 OF SECTION 9,  
 T23N, R9W, N.M.P.M.,  
 SAN JUAN COUNTY, NEW MEXICO



**NOTES**

- 1) BASIS OF BEARINGS FOR THIS SURVEY ARE BETWEEN FOUND MONUMENTS AT THE SOUTHEAST CORNER AND THE EAST QUARTER CORNER OF SECTION 9, TOWNSHIP 23 NORTH, RANGE 9 WEST, N.M.P.M., SAN JUAN COUNTY, NEW MEXICO. LINE BEARS: N 0°23'49" W 2642.29'
- 2) DATE OF FIELD SURVEY: DECEMBER, 2015.
- 3) THIS EXHIBIT IS NOT A BOUNDARY SURVEY AND SHOULD NOT BE USED AS SUCH.
- 4) THIS EXHIBIT MAY NOT SHOW ALL EXISTING EASEMENTS AND UTILITIES.
- 5) CALL THE NEW MEXICO 811 SYSTEM FOR UTILITY LOCATIONS BEFORE EXCAVATING OR DIGGING.



PREPARED BY:



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

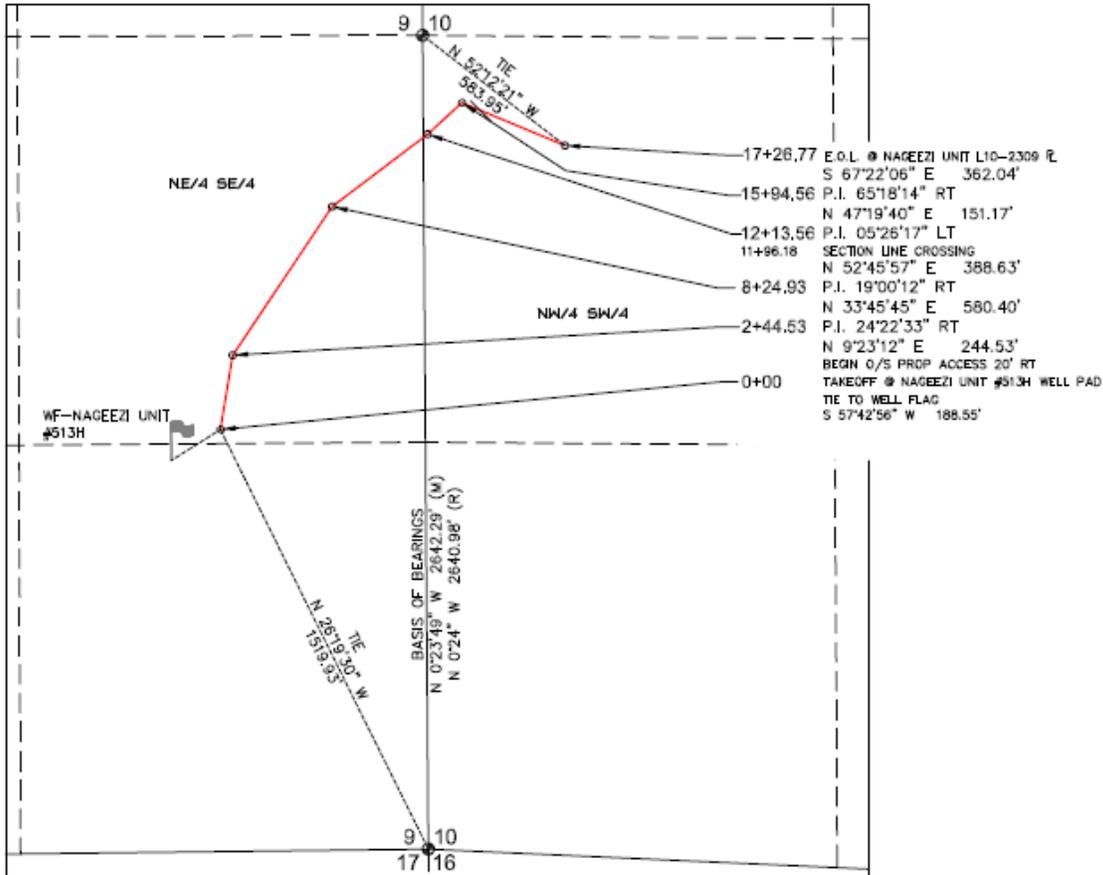
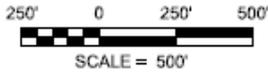
~ SURFACE OWNERSHIP ~ BUREAU OF LAND MANAGEMENT	
SECTION 10, T23N, R9W 04+00 TO 10+02.81 1002.81 FT / 60.78 RODS	
SECTION 9, T23N, R9W 10+02.81 TO 21+73.25 1170.44 FT / 70.94 RODS	
<b>TOTAL</b> 04+00 TO 21+73.25 2173.25 FT / 131.71 RODS	
DATE OF SURVEY 12/03/15 [GR, NY]	

DRAWING: NAGEEZI UNIT_513H_REV1	
SCALE: 1" = 500'	REV. 1 12/03/2015
DRAFTED BY: GRR	JOB# ENC345
SHEET: 1 of 1	

PROPOSED PIPELINES FOR  
**ENCANA OIL & GAS (USA) INC.**  
**NAGEEZI UNIT #513H**

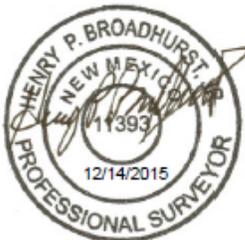


LOCATED IN THE NE/4 SE/4 OF SECTION 9,  
 NW/4 SW/4 OF SECTION 10,  
 T23N, R9W, N.M.P.M.,  
 SAN JUAN COUNTY, NEW MEXICO



**NOTES**

- 1) BASIS OF BEARINGS FOR THIS SURVEY ARE BETWEEN FOUND MONUMENTS AT THE SOUTHEAST CORNER AND THE EAST QUARTER CORNER OF SECTION 9, TOWNSHIP 23 NORTH, RANGE 9 WEST, N.M.P.M., SAN JUAN COUNTY, NEW MEXICO  
 LINE BEARS: N 0°23'49" W 2642.29'
- 2) DATE OF FIELD SURVEY: DECEMBER, 2015.
- 3) THIS EXHIBIT IS NOT A BOUNDARY SURVEY AND SHOULD NOT BE USED AS SUCH.
- 4) THIS EXHIBIT MAY NOT SHOW ALL EXISTING EASEMENTS AND UTILITIES.
- 5) CALL THE NEW MEXICO 811 SYSTEM FOR UTILITY LOCATIONS BEFORE EXCAVATING OR DIGGING.



PREPARED BY:

**CCI**

**CHENAULT CONSULTING INC.**

4800 COLLEGE BLVD #105  
 FARMINGTON, NM 87402  
 (505) 325-7707

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

~ SURFACE OWNERSHIP ~ BUREAU OF LAND MANAGEMENT	
SECTION 9, T23N, R9W 0+00 TO 11+96.18 1196.18 FT / 72.50 RODS	
SECTION 10, T23N, R9W 11+96.18 TO 17+26.77 530.59 FT / 32.16 RODS	
TOTAL 0+00 TO 17+26.77 1726.77 FT / 104.65 RODS	
DATE OF SURVEY 12/02/15	GR, NF

DRAWING: NAGEEZI UNIT 513H_REV1	
SCALE: 1" = 500'	REV. 1 12/03/2015
DRAFTED BY: GRR	JOB# ENC345
SHEET: 1 of 1	

# APPENDIX D. SURFACE RECLAMATION PLAN

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