United States Department of the Interior
Bureau of Land Management

Environmental Assessment DOI-BLM-NM-F010-2014-0145

Cluster 15
Escrito E07-2407
Escrito D14-2407
Escrito L14-2408

Lease Numbers:

NM 1176566

NM 557389

NMNM 117567

NM 16589

NMNM 1409

NMNM 16589

May 2014

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

BLM

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.

TABLE OF CONTENTS

1. Purpose and Need for Action 1
1.1 Background 1
1.2 Purpose and Need for Action 1
1.3 Decision to be Made 1
1.4 Conformance with Applicable Land Use Plan(s) 2
1.5 Relationship to Statutes, Regulations, or Other Plans 2
1.6 Scoping, Public Involvement, and Issues 3
1.6.1 Issues Considered but Not Analyzed 4
2. Description of the Proposed Action and Alternatives 6
2.1 Proposed Action 6
2.1.1 Design Features 13
2.2 No Action 18
2.3 Alternatives Considered but Eliminated 18
3. Affected Environment and Environmental Consequences 20
3.1 Air Resources 20
3.1.1 Affected Environment 20
3.1.2 Impacts from the Proposed Action 23
3.2 Water Resources/Quality – Surface and Groundwater 26
3.2.1 Affected Environment 26
3.2.2 Impacts from the Proposed Action 29
3.3 Upland Vegetation and Noxious Weeds 31
3.3.1 Affected Environment 31
3.3.2 Impacts from the Proposed Action 32
3.4 Wildlife 34
3.4.1 Affected Environment 34
3.4.2 Impacts of the Proposed Action 35
3.5 Special Management Species 39
3.5.1 Affected Environment 39
3.5.2 Impacts from the Proposed Action 40
3.6 Migratory Birds 42
3.6.1 Affected Environment 42

3.6.2 Impacts from the Proposed Action 43
3.7 Cultural Resources 44
3.7.1 Affected Environment 44
3.7.2 Impacts from the Proposed Action 45
3.8 Livestock Grazing 46
3.8.1 Affected Environment 46
3.8.2 Impacts from the Proposed Action 47
4. Supporting Information 48
4.1 Tribes, Individuals, Organizations, or Agencies Consulted 48
4.2 List of Preparers 48
4.3 References 50
Appendix A – Maps and Photographs A-1
Appendix B – Applications for Permit to Drill and Right-of-Way Grant Applications B-1
Appendix C – Conditions of Approval and Stipulations C-1
Appendix D – Biological Survey Reports D-1

LIST OF TABLES

Table 2-1. Proposed action component legal descriptions 6
Table 2-2. Summary of proposed disturbance 7
Table 2-3. Temporary use area locations, size, and acreage 9
Table 2-4. Short- and long-term disturbance per land status for the proposed action 9
Table 3-1. Reported ozone values for San Juan County ozone monitoring stations 21
Table 3-2. Criteria pollutant design value concentrations monitored in San Juan County 22
Table 3-3. Climate normals for the Farmington area, 1981-2010 23
Table 3-4. Criteria pollutant and volatile organic compound emissions estimated for construction of one horizontal oil well (average 25 days to drill and complete) 24
Table 3-5. Analysis area human-caused emissions in tons/year, 2008 25
Table 3-6. Percent increase in analysis area emissions per well 25
Table 3-7. Potential jurisdictional waters of the U.S. in the analysis area 27
Table 3-8. Standard Crow Mesa Pinyon-juniper Community seed mix Persistent 33
Table 3-9. Standard Crow Mesa Sagebrush/grass Community seed mix 34
Table 3-10. Estimated traffic levels resulting from the proposed action 37
Table 3-11. Average daily truck trips per well for 3-year period 38
Table 3-12. Species with special management status with potential to occur in the analysis area 39
Table 3-13. Migratory bird species of concern potentially occurring within the analysis area and effects from the proposed action 43
Table 3-14. Details of the grazing allotments in the analysis area 46

LIST OF FIGURES

Figure 1. Proposed Escrito Cluster 15 Vicinity Map A-2
Figure 2: Proposed Escrito Cluster 15 Analysis Area A-3
Figure 3: Proposed Escrito Cluster 15 Site Detail East A-4
Figure 4. Proposed Escrito Cluster 15 Site Detail West A-5
Figure 5. Escrito E07-2407 development and operation access routes A-6
Figure 6. Watersheds in the Cluster 15 analysis area A-7

LIST OF PHOTOGRAPHS

Photograph 1: Escrito E07-2407 looking northwest from the access road and pipeline corridor A-8
Photograph 2: Escrito E07-2407 looking south from well pad corner 2 ..... A-8
Photograph 3: Escrito D14-2407 looking southwest from well pad corner 2 ..... A-9
Photograph 4: Escrito D14-2407 looking northeast from the end of the access road and pipeline corridor A-9
Photograph 5: Escrito L14-2408 looking northeast from well pad corner 5 ..... A-10
Photograph 6: Escrito L14-2408 looking south from the well pad center stake A-10

ACRONYMS & ABBREVIATIONS

°F	degrees Fahrenheit
µg/m³	micrograms per cubic meter
APD	Application for Permit to Drill
AUM	animal unit month
bbl	barrels per day
BLM	Bureau of Land Management
BOP	blowout preventer
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	Methane
Cluster 15	Escrito E07-2407, Escrito D14-2407, and Escrito L14-2408 well pads
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COA	Conditions of Approval
EA	Environmental Assessment
Ecosphere	Ecosphere Environmental Services
Encana	Encana Oil & Gas (USA) Inc.
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FFO	Farmington Field Office
GHG	greenhouse gas

HAP	hazardous air pollutant
LAC	La Plata Archaeological Consultants, LLC
MLA	Mineral Leasing Act
NAAQS	National Ambient Air Quality Standards
NATA	National Scale Air Toxics Assessments
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset
NMAAQS	New Mexico Ambient Air Quality Standards
NMPIF	New Mexico Partners in Flight
NMPM	New Mexico Principal Meridian
NO_2	nitrogen dioxide
NO_x	nitrous oxides
PL	Public Law
PM	particulate matter
$PM_{2.5}$	particulate matter less than 2.5 micrometers in diameter
PM_{10}	particulate matter between 2.5 and 10 micrometers in diameter
POD	Point of Diversion
ppb	parts per billion
ppm	parts per million
PRMP	Proposed Resource Management Plan
RFDS	Reasonable Foreseeable Development Scenario
RMP	Resource Management Plan
ROD	Record of Decision
ROW	right-of-way
SO_2	sulfur dioxide
TUA	temporary use area
USC	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	volatile organic compound

1. PURPOSE AND NEED FOR ACTION

1.1 Background

Encana Oil & Gas (USA) Inc. (Encana) is proposing to develop the Escrito E07-2407, Escrito D14-2407, and Escrito L14-2408 well pads (Cluster 15) in San Juan and Rio Arriba counties, New Mexico. The proposed project would be located on Bureau of Land Management (BLM) and State of New Mexico lands and would access minerals administered by the BLM Farmington Field Office (FFO). Encana filed Applications for Permit to Drill (APDs) with the BLM/FFO to drill four wells (01H, 02H, 03H, and 04H) from the Escrito E07-2407 and Escrito L14-2408 pads and two wells (01H and 02H) from the Escrito D14-2407 pad. For each proposed location, Encana applied for right-of-way (ROW) grants with the BLM/FFO to construct the three well pads, well-tie pipelines, and access roads. All of the proposed pads are located off lease. Encana would file for a ROW grant with the New Mexico State Land Office to construct the portion of the proposed Escrito L14-2408 pipeline located on state land. Encana has also applied for ROW grants with the BLM/FFO to upgrade existing roads.

Surface-disturbance activities associated with well drilling would include construction of three well pads, three access roads, three subsurface well-tie pipelines, and making upgrades to an existing access road. The proposed project is located approximately 6 miles north of U.S. Highway 550 and 11 miles east of Nageezi, New Mexico. The Jicarilla Apache Nation is located approximately 6.75 miles east of the eastern extent of the proposed project.

1.2 Purpose and Need for Action

The purpose of the proposed action is to provide Encana with reasonable access to BLM-managed federal mineral leases (NM 1176566, NM 557389, NMNM 117567, NM 16589, NMNM 1409, and NMNM 16589) to construct the proposed well pads, access roads, and pipelines, and to drill the proposed wells.

The need for the action is BLM's responsibility under the Mineral Leasing Act (MLA) of 1920, as amended (30 United States Code [USC] 181 et seq.), to respond to the APDs and ROW applications. The MLA authorizes the BLM to issue oil and gas leases for the exploration of mineral resources and permit the development of those leases. The need for the action also is established by the BLM's authority under Title V of the Federal Land Policy and Management Act, as amended (43 USC 1761-1771), and Section 28 of the MLA (43 USC 185).

1.3 Decision to be Made

Based on the information in this Environmental Assessment (EA), the BLM/FFO will decide whether to approve the APDs and ROW grants, and if so, under what terms and conditions. In compliance with the MLA, the decision to be made is how resource development should occur. Under the National Environmental Policy Act (NEPA), as amended (Public Law [PL]. 91-90, 42 USC 4321 et seq.), the BLM/FFO must determine if there are any significant environmental impacts associated with the proposed action, warranting further analysis in an Environmental Impact Statement (EIS). The BLM/FFO Field Manager is the responsible officer who will make one of the following decisions:

- Approve the proposed APDs and ROW grants with design features as submitted
- Approve the proposed APD and ROW grants with additional mitigations
- Analyze the effects of the proposal in an EIS
- Deny the APD and ROW grants

1.4 Conformance with Applicable Land Use Plan(s)

Pursuant to 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21, this EA incorporates the information and analysis contained in the 2003 Farmington Proposed Resource Management Plan (PRMP)/Final Environmental Impact Statement (FEIS) (USDI/BLM 2003a). The proposed action would be in conformance with the oil and gas leasing and development management actions in the Resource Management Plan (RMP)/Record of Decision (ROD) signed in December 2003 and updated later that month (USDI/BLM 2003b). The proposed action would be in conformance with the 2003 RMP/ROD that states, to the extent possible, new ROWs will be located within or parallel to existing ROWs or corridors to minimize resource impacts (USDI/BLM 2003b, page 2-11).

The PRMP/FEIS and ROD are available for review at the BLM/FFO in Farmington, New Mexico or electronically at http://www.nm.blm.gov/ffo/ffo_home.html. This project EA addresses site-specific resources and/or impacts that are not covered within the PRMP/FEIS, as required by the NEPA.

Oil and gas development is recognized as an appropriate use of public lands in the FFO planning area (USDI/BLM 2003b). The RMP adheres to the federal mandates contained in the Energy Policy and Conservation Action (42 USC 6217) and Executive Order 13212, that direct federal land management agencies to expedite production of the federal mineral estate for development of reliable domestic energy sources (USDI/BLM 2003b, pages 1 and 11). The proposed project would not conflict with any local, county, or state plans.

A Reasonable Foreseeable Development Scenario (RFDS) developed for the 2003 RMP estimated foreseeable oil and gas development in the New Mexico portion of the San Juan Basin, beginning in January 2002 and lasting 20 years. The RFDS also contemplated that technological advances could alter development of the basin during that 20-year period. The Mancos Shale reservoir was analyzed in the RFDS as an emerging gas play over much of the basin where it had not been developed previously (Engler et al. 2001). The PRMP/FEIS for lands managed by the BLM/FFO indicates development of 9,942 new oil and gas wells from 2003 to 2023 in the San Juan Basin, allowing for about 16,100 acres of long-term disturbance. The ROD approving the final plan acknowledged these and future projected impacts, when balanced against the nation's need for domestic energy sources (USDI/BLM 2003a, 2003b, page 12). The proposed action is within the scale and pace of the RFDS; therefore, cumulative impacts from the proposed action were included and analyzed in the Farmington PRMP/FEIS (USDI/BLM 2003a).

1.5 Relationship to Statutes, Regulations, or Other Plans

Encana would comply with all applicable federal, state, and local laws and regulations, and would obtain the necessary permits for installation and operation of the pipeline. These laws and regulations include, but are not limited to:

- Antiquities Act of 1906, as amended (PL 52-209; 16 USC 431-433)
- American Indian Religious Freedom Act of 1978 (PL 95-431; 92 Stat. 469; 42 USC 1996)
- Archaeological Resources Protection Act of 1979 (PL 96-95; 93 Stat. 721; 16 USC § 470aa et seq.), as amended (PL 100-555; PL 100-588)
- Bald and Golden Eagle Protection Act of 1940, as amended (PL 86-70, PL 87-884, PL 92-535, PL 95-616; USC 668-668d)
- Clean Air Act, as amended (PL 88-206; 42 USC § 7401 et seq.)
- Clean Water Act, as amended (PL 107-303; 33 USC § 1251, et seq.)
- Colorado River Salinity Control Act, as amended (PL 93-320; 7 CFR Part 702)
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (PL 96-510; 42 USC § 9601; 40 CFR Part 307)
- Endangered Plant Species Act (N.M. Stat. 1978 § 75-6-1)
- Endangered Species Act of 1973 (PL 93-205; 16 USC § 1531 et seq.)
- Executive Order 11988 Floodplain Management
- Executive Order 11990 Protection of Wetlands
- Executive Order 12898 Environmental Justice
- Executive Order 13007 Indian Sacred Sites
- Executive Order 13112 Invasive Species
- Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds
- Migratory Bird Treaty Act of 1918, as amended (16 USC §§ 703-712; 50 CFR Part 21)
- Native American Graves Protection and Repatriation Act of 1990 (PL 101-601; 104 Stat. 3048; 25 USC 3001; 43 CFR Part 10)
- New Mexico Oil and Gas Act (N.M. Stat. § 70-2-1–38) and related statutory provisions
- Paleontological Resources Preservation Act as part of the Omnibus Public Land Management Act (PL 111-011, Title VI, Subtitle D)
- Safe Drinking Water Act, as amended (PL 93-523; 42 USC 300F-300-9), 40 CFR Parts 144 and 147).
- Section 106 of the National Historic Preservation Act of 1966 (PL 89-665; 80 Stat. 915; 16 USC 470 et seq.), as amended (implemented under regulations of the Advisory Council on Historic Preservation, 36 CFR Part 800)
- Wildlife Conservation Act (N.M. Stat. 1978 § 17-2-37 et seq.)

1.6 Scoping, Public Involvement, and Issues

The Council on Environmental Quality (CEQ) defines scoping as “an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action alternative” (40 CFR 1501.7). Scoping is the process by which the BLM solicits internal and external input on the issues, impacts, and potential alternatives that will be addressed in an EIS or EA. As outlined in the BLM NEPA Handbook, it is optional for the BLM to conduct external scoping on actions analyzed by an EA (USDI/BLM 2008a, Section 6.3.2).

The BLM/FFO Interdisciplinary Team was integrally involved in the internal scoping to identify potential issues, understand the proposal, develop the purpose and need, and develop a range of alternatives.

For the purpose of the BLM's NEPA analysis, an "issue" is a point of disagreement, debate, or dispute with a proposed action based on some anticipated environmental effect. Preliminary issues are frequently identified during development of the proposed action through scoping.

The Interdisciplinary Team identified the following issues as potential issues of concern during internal scoping:

- How would the alternatives affect air quality in the area?
- How would the alternatives affect water resources?
- How would the alternatives affect upland vegetation and noxious weeds?
- How would the alternatives affect wildlife, BLM special management species, State of New Mexico listed species, and migratory birds?
- How would the alternatives affect cultural resources?
- How would the alternatives affect livestock grazing?

As outlined in the BLM NEPA Handbook, it is optional for the BLM to conduct external scoping on actions analyzed by an EA (USDI/BLM 2008a, Section 6.3.2). External scoping was conducted through posting this project on the BLM/FFO's online NEPA log. The log is located on the BLM New Mexico website (http://www.blm.gov/nm/st/en/prog/planning/nepa_logs.html). The log contains a list of proposed and approved actions in the BLM/FFO. The public is encouraged to provide comments or request information on projects listed in the logs.

1.6.1 Issues Considered but Not Analyzed

CEQ regulations (40 CFR § 1501.7) state that the lead agency shall identify and eliminate from detailed study the issues that are not important or have been covered by prior environmental review, narrowing the discussion of these issues in the document to a brief presentation of why they would not have a significant effect on the human or natural environment, or providing a reference to their coverage elsewhere.

The Interdisciplinary Team identified the following resources during internal scoping as potential issues of concern that would not be significantly impacted or have been evaluated in previous analyses.

For the proposed action, identification of Native American Religious Concerns was limited to reviewing existing, published, and unpublished literature (Van Valkenburgh 1941, 1974; Brugge 1993; Kelly et al. 2006); the site-specific Class III survey report prepared for the proposed action; and a review by the BLM's cultural resources program regarding the presence of traditional cultural properties identified through ongoing BLM tribal consultation efforts. There are currently no known remains that fall within the purview of the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) or the Archaeological Resources Protection Act (16 USC 470) within the proposed action area. The proposed action would not impact any known traditional cultural properties, 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 Executive Order 13007.

No federally listed species potentially occurring in Rio Arriba or San Juan counties or potential habitats for federally listed species were observed within the analysis area. Furthermore, no designated critical habitat for any federally listed species occurs within the analysis area. Water for drilling and completions would be sourced from a private water well that has been permitted by the state of New Mexico (Point of Diversion [POD] Number SJ 2105 as designated by the New Mexico Office of the State Engineer). Approximately 1.3 million gallons of water would be used for drilling and completions per well. No new water depletions to the San Juan River would occur. No further consultation with the United States Fish and Wildlife Service (USFWS) is required. The BLM/FFO reviewed and determined that the proposed action is in compliance with listed species management guidelines outlined in the September 2002 Biological Assessment (Cons. No. 2-22-01-I-389) (USDI/BLM 2002).

2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

Encana is proposing development of the Cluster 15 well pads, well-tie pipelines, access roads, and upgrading the existing roads to access the federal mineral estate administered by the BLM/FFO. The proposed project is located approximately 6 miles north of U.S. Highway 550 and 11 miles east of the community of Nageezi in San Juan and Rio Arriba counties, New Mexico. A project vicinity map is provided as Figure 1 (see Appendix A). Figure 2 shows the proposed action on the Crow Mesa East and Crow Mesa West, New Mexico United States Geological Survey (USGS) 7.5-minute topographic maps. Figures 3 and 4 display the proposed action on the 2010 digital photo orthoquad (see Appendix A). Photographs of the proposed action components are provided in Appendix A. Legal descriptions of the proposed action components are listed in Table 2-1.

Table 2-1. Proposed action component legal descriptions

Component	Legal Description
Lybrook E07-2407 well pad	NW ¼ of Section 7, Township 24 North, Range 7 West NE ¼ of Section 12, Township 24 North, Range 8 West, NMPM
Lybrook E07-2407 access road	Section 12 in Township 24 North, Range 8 West, NMPM
Lybrook E07-2407 pipeline	Section 7 in Township 24 North, Range 7 West, NMPM
Lybrook D14-2407 well pad and access road	NW ¼ of Section 14, Township 24 North, Range 7 West, NMPM
Lybrook D14-2407 pipeline	Sections 11, 12, 13, and 14 in Township 24 North, Range 7 West, NMPM
Lybrook L14-2308 well pad	SW ¼ of Section 14 and SE ¼ Section 15, Township 24 North, Range 8 West, NMPM
Lybrook L14-2308 access road	Sections 14 and 15 in Township 24 North, Range 8 West, NMPM
Lybrook L14-2308 pipeline	Sections 14, 15, 16, and 17 in Township 24 North, Range 7 West, NMPM

Note: NMPM=New Mexico Principal Meridian; NW=northwest; NE=Northeast; SW=southwest; SE=southeast

As proposed, two to four wells would be horizontally drilled from each proposed well pad. Activities associated with the proposed project would include construction of access roads and well pads; drilling, stimulation, and completion of the proposed wells; installation of surface facilities necessary to produce the wells; and installation of pipelines to transport natural hydrocarbons to markets. These activities are detailed below.

Construction

Construction of access roads and well pads would take approximately 1 to 2 weeks per location. Table 2-2 provides a summary of disturbance that would occur under the proposed action. The total surface disturbance associated with the proposed action would be approximately 54.91 acres. Approximately 14.3 acres of this have been previously disturbed and approximately 7.1 acres would remain disturbed after interim reclamation for access and operation.

Table 2-2. Summary of proposed disturbance

Component	Dimension/Description	Total Disturbance (acres)
Escrito E07-2407		
Well pad	490 by 400 feet 50 feet wide construction zone	6.77
New Access Road[1]	264 feet	0.18
Well-tie Pipeline[2]	5,132 (5,150 feet outside the well pad)	4.73
	Total	11.68
Escrito D14-2407		
Well pad	430 by 400 feet 50 feet wide construction zone	4.87
New Access Road[1]	238 feet (15 feet outside the well pad)	0.02
Well-tie Pipeline[2]	11,058 feet (10,819 feet outside the well pad)	9.93
Temporary Use Area	10,819 by 20 feet	4.97
	Total	19.79
Escrito L14-2408		
Well pad	490 by 400 feet 50 feet wide construction zone	6.77
New Access Road[1]	837 feet	0.58
Upgrade Access Road[1]	4,277 feet	2.95
Well-tie Pipeline[2]	12,523 feet	10.20
Temporary Use Area		2.94
	Total	23.44
	Total Project Disturbance	**54.91**

1 permitted within a 30-ROW

2 permitted within a 40-foot ROW on BLM land, 30-foot ROW on State of New Mexico land

The proposed Escrito E07-2407 01H, 02H, 03H, and 04H wells would require constructing a pad measuring 490 feet by 400 feet, with a 50-foot-wide construction zone around the perimeter of the pad. The maximum cut would be approximately 11.4 feet at corner 3 and the maximum fill would be approximately 14.2 feet at corner 6. To access the site, Encana would construct a new 264-foot access road. The road would be permitted within a 30-foot ROW on BLM-managed land. Additionally, an existing access road would be upgraded between the proposed access road and U.S. Highway 550. All activities would occur within the existing footprint of the existing road and no new disturbance would result. During drilling and completion, the Escrito E07-2407 location would be accessed from the south and east. For production, the location would be access from the south and west. Figure 5 shows the two access routes that would be used (Appendix A). Encana would also construct a well tie pipeline—approximately 5,150 feet long—within a 40-foot-wide ROW. Total disturbance would be approximately 11.68 acres. Approximately 2.37 acres of the proposed pipeline ROW has been previously disturbed. Total new disturbance from the proposed project would be approximately 9.26 acres.

The proposed Escrito D14-2407 01H and 02H wells would require constructing a 430-foot by 300-foot pad with a 50-foot-wide construction zone around the perimeter of the well pad. The maximum cut would be approximately 13 feet at corner 3 and the maximum fill would be approximately 10 feet at corner 6. To access the site, Encana would construct an approximately 238-foot access road with a permitted 30-foot-wide ROW on BLM-managed lands. Approximately 223 feet of the access road occurs within the proposed well pad and construction zone and would not create additional surface disturbance.

For the proposed Escrito D14-2407, Encana is also proposing a pilot project to test a three-phase gathering system. Encana would construct, operate, maintain, and terminate two pipelines that are each 11,058 feet (2.1 miles) in length. One pipeline would be an 8-inch, steel, 3-phase gathering pipeline and the other pipeline would be a 6-inch, steel, gas lift pipeline. The proposed pipelines would be permitted with a 40-foot-wide ROW with a 20-foot-wide temporary use area (TUA) for construction along the entire length of the ROW. Total disturbance from the well pad, pipeline, and road would be approximately 19.79 acres. Approximately 3,562 feet of the proposed pipeline would be constructed on an abandoned (permanently closed) road. Approximately 6,073 feet of the proposed pipeline ROW would be located adjacent to County Road 508. Based on a 20-foot-wide overlap with existing disturbance, approximately 4.42 acres of the proposed pipeline ROW would be located on existing disturbance. Total new disturbance would be approximately 14.9 acres.

The proposed Escrito L14-2408 01H, 02H, 03H, and 04H wells would require constructing a 490-foot by 400-foot pad with a 50-foot wide construction zone around the perimeter of the well pad. The maximum cut would be approximately 16 feet between corners 2 and 3 and the maximum fill would be approximately 15 feet at corner 6. To access the site, Encana would construct 837 feet of new road and would upgrade 4,277 feet of an existing two track. Upgrading the existing road would require widening of the existing disturbance. The road upgrade would be permitted with a BLM 30-foot-wide ROW. Total disturbance from the road upgrade would be 2.95 acres; however, this road upgrade would not add to the existing road network. Until the wells are determined viable, Encana would likely tie into an existing Bline pipeline. Should the wells be productive, Encana would construct, operate, and maintain a well-tie pipeline that would be approximately 12,523 feet in length. Approximately 6,956 feet of the proposed well-tie pipeline would cross BLM-administered lands, and would be constructed within a 40-foot ROW. The remaining 5,567 feet of the proposed pipeline crosses State of New Mexico lands, and would be constructed within a 30-foot ROW. Five TUAs would be needed to construct the proposed pipeline and access road. Total surface disturbance from TUAs would be 2.94 acres. The locations and dimensions of the TUAs are listed in Table 2-3. Total disturbance from the well pad, access road, and pipeline would be approximately 23.44 acres. Approximately 7.04 acres have been previously disturbed. Total new disturbance would be 16.40 acres.

Table 2-3. Temporary use area locations, size, and acreage

Station	Dimension (feet)	Disturbance (acres)
Pipeline TUAs		
0+87.97 to 4+10.81	325 by 80[1]	0.60
6+00.76 to 10+67.48	465 by 80	0.85
72+14.16 to 76+20.98	405 by 80	0.74
Access Road TUAs		
2+56.29 to 4+47.92	191 by 65	0.29
4+47.92 to 6+46.33	400 by 50	0.46
	Total	**2.94**

Following interim reclamation, the proposed action would require approximately 4.8 acres of long-term disturbance for well operation. New access roads and the upgrade on the two-track road leading to the Escrito L14-2408 location would contribute to 2.3 acres to long-term disturbance. Pipelines and TUAs, and the road upgrade to the Escrito E07-2407 (which would not require widening) would not contribute to long-term disturbance. Table 2-4 shows short- and long-term disturbance by land status.

Table 2-4. Short- and long-term disturbance per land status for the proposed action

Land Status	Short-Term Disturbance (acres)	Long-Term Disturbance (acres)[1]
Bureau of Land Management	51.11	7.10
State of New Mexico	3.8	0
Total	54.91	7.10

[1] Based on new 30-foot-wide access roads and 1.6 acres per well for operation

Drilling and Completion

After well pad construction is complete, Encana would mobilize a drilling rig to drill wells from each pad. During drilling operations, equipment on the site would include:

- The drilling rig
- Stockpiles of drill pipe and casing
- A closed-loop system and aboveground tanks for collecting cuttings and fluid
- Mud shakers to separate the cuttings from the fluid
- Generators to provide power to the drilling rig
- Office trailers equipped with sleeping quarters for essential personnel

Drilling activities would occur continuously for approximately 2 weeks per well and would require on-site supervision 24 hours a day. Completion activities are expected to take 1 to 3 weeks per well.

Drilling operations would be conducted in compliance with all Federal Onshore Oil and Gas Orders, all applicable Federal and State of New Mexico rules and regulations, and BLM Notice to Lessees. The proposed wells would be horizontal wells targeting the Escrito-Gallup and Dufers Point-Gallup Dakota pools. The proposed wells would be drilled to total vertical depths ranging between 5,717 and 6,324 feet and then horizontally drilled.

Using a freshwater-based drilling mud system, surface casing would be set to an approximate depth of 500 feet. After the surface casing is installed, it would be cemented in place by pumping cement down the casing, circulating the cement back up the outside of the casing to create a cement sheath around the entire casing, and then tested to ensure the quality and integrity of the cement. Prior to drilling below the surface casing, a blowout preventer (BOP) would be installed on the surface casing, and both the BOP and surface casing would be pressure tested for integrity. After installation and testing of the BOP, a string of intermediate casing would be installed to the kick-off point of the lateral. The intermediate casing would be cemented and then tested to ensure the quality and integrity of the cement.

After cementing the intermediate string, a synthetic oil-based drilling mud system would be used to drill the horizontal portion of the wellbore. Additives may be mixed with the mud system to achieve borehole stability, minimize possible damage to geologic formations, provide adequate viscosity to carry the drill cuttings out of the wellbore, and reduce downhole fluid losses.

After drilling the wellbore to its final depth, a production liner would be run and secured into place utilizing an external swell packer system. The production liner provides additional isolation of the wellbore and creates a pathway for natural gas or liquids to travel from the formation to the surface.

After the production liner has been secured in place, the drilling rig would be removed and a completion rig moved to the site. The completion rig would run a completions string of the same size, weight, and grade as the production liner into the wellbore to tie-in to the liner/liner hanger, providing a secondary barrier during completions that protects intermediate casing from pressures needed to pump into the formation. During completion activities, the well pads would have completions rigs, completions command centers, steel storage tanks, pump trucks and transports, blending and mixing facilities, and related ancillary completions equipment.

Completing the well would require hydraulic fracturing—the process of injecting water, sand, and a small amount of fluid additives into the wellbore under very high pressure to fracture the formation and release the hydrocarbons. A series of charges would be set through the producing interval in the horizontal portion of the wellbore to perforate the production liner and casing and create small fractures in the target formation. A fluid and sand mixture would be injected at high pressure into the formation to create cracks or fractures; the sand would act as a proppant to keep the fractures open and allow gas or liquid hydrocarbons to move more efficiently into the wellbore. The fracturing process would be done in stages, with each stage continuing in the same manner along the horizontal portion of the wellbore, using a series of plugs to isolate portions of the well that were previously fractured. After all of the stages are completed, the plugs would be drilled out to allow gas or fluids to flow to the wellhead.

Completions would be designed with nitrogen foam to minimize water usage and improve fluid recoveries post-completions. Water would be sourced from a private water well located in the SW ¼ NE ¼ of Section 32, Township 25 North, Range 9 West, NMPM. This water well has been permitted by

the state of New Mexico, and has been assigned the POD Number SJ 01979-S4 by the New Mexico Office of the State Engineer. Water would be stored on-site in up to 15 steel storage tanks.

Production

Production facilities at the well pads would consist of wellheads, metering units, separators, aboveground condensate and produced water tanks (two tanks per well), and compressors. If artificial lift is required, conventional pumping units (pump jacks) and/or gas lift systems would be installed.

Tank batteries would be placed within corrugated steel secondary containment berms and would be sized to contain a minimum of 110 percent of the storage capacity of the largest tank within the berm. Containment berms would include an impermeable liner attached to the rings and laid under the tanks. All loading lines would be placed inside the containment berm or would have secondary containment vessels.

Installation of production equipment would take 2 to 3 weeks per well pad. Production facilities would be in place for the life of the wells (anticipated to be 30 to 50 years).

Well-tie Pipeline Installation

The proposed well-tie pipelines would be up to 6-inch outside diameter buried steel pipelines with a maximum allowable operating pressure of 500 pounds per square inch gauge. Related aboveground appurtenances installed within the pipeline workspace would include cathodic protection equipment, futures, and block valves with blowdowns.

The trench line, or ditch, would be excavated and sloped in accordance with Occupational Safety and Health Administration specifications. The cover from top-of-pipe to ground level would be a minimum of 36 inches through typical soil and rock, and a minimum depth of 48 inches at road crossings. Excavated material would be stockpiled at the edge of the workspace.

The trenching operation would be followed by pipe installation that would include stringing, bending for horizontal or vertical angles in the alignment, welding pipe segments together, inspection, coating joint areas to prevent corrosion, and lowering into the trench. Backfilling would begin after a section of pipe has been successfully placed in the ditch and final inspection has been completed.

Cleanup activities would be initiated as soon as practicable after backfilling activities have been completed. The pipelines would be seeded with the seed mix and rates provided in the Reclamation Plan attached to the APDs for the well pads.

Construction and pipeline installation activities would take 4 to 6 weeks per pipeline and reclamation activities would take 1 to 2 weeks per pipeline. The pipelines and related aboveground appurtenances would be in place for the life of the wells (30 to 50 years).

Three-Phase Pilot Pipeline Installation

The proposed action would include a three-phase pilot project to evaluate the feasibility of installing a consolidated liquids storage facility for multiple wells. The natural gas produced by the proposed wells would be transported via the well-tie pipelines into existing or proposed gathering lines. However, produced oil and water is stored on-site in tanks and then transported to facilities by truck. The pilot project would allow the produced oil and water for multiple wells to be separated and stored at a

consolidated site. In some cases, the benefits of consolidation can include reduced traffic for hauling produced oil and water, reduced surface disturbance, reduced installation cost, and increased operating efficiencies.

The liquids produced from other wells drilled to the target formation in the region are prone to high paraffin content. Paraffin may preclude the liquids from being transported through the pipeline during cold weather, require more frequent pigging of the line to prevent buildup in the line, and increase the risk of complete pipeline blockage that could require wells feeding the system to be shut-in until the line can be unblocked.

With the three-phase gathering system, the gas lift compression system (artificial lift) that is generally installed at the well pad would be installed at the centralized facility. This requires the installation of a pipeline between the well pad and the centralized facility for gas lift service back to the well pad. Encana would construct an 8-inch diameter pipeline parallel to the Escrito D14-2407 well-tie pipeline (in the same trench) to test whether it is feasible to use consolidated facilities for produced water and/or oil. Aboveground facilities that would be installed would include separators, storage tanks, and gas lift compressors.

The following permit allowances would be required to implement the pilot project.

- A BLM permit allowance would be required to set separation equipment, storage tanks, and ancillary systems for the Escrito D14-2407 wells at the Escrito E13-2407 well pad.
- A BLM permit allowance would be required for ROW to install multiple pipelines.
- A BLM permit allowance would be required for wellhead combined stream metering for gas and oil volume allocation back to the individual wells. This would consist of a single meter for the combined oil, water, and solution gas stream. One meter would be installed on each well. This would eliminate the need to install, operate, and maintain a production separator on each well.
- A BLM permit allowance would be required to insulate any aboveground pipeline segments. The insulation may be necessary to mitigate excessive paraffin formation and potential blockage in the pipeline system.
- A BLM permit allowance would be required prior to setting production separators, storage tanks, gas lift compressors, vapor recover unit compressors, and ancillary systems at the Escrito D14-2407 well pad should the three-phase pipeline become plugged with paraffin.

Interim Reclamation

After production facilities are installed at the pads, the well pads would be reduced to the minimum surface area needed for production facilities and future operations. Interim reclamation would consist of grading and re-contouring the portion of the well pad not needed for production facilities/future operations to blend with adjacent natural surroundings as much as practicable, covering with salvaged topsoil material, and seeding to reestablish vegetation. Seed mixtures and rates would be in accordance with the Reclamation Plans for the proposed action. Sediment- and erosion-control measures would be implemented, as necessary. Interim reclamation would reduce the disturbed area to approximately

1.6 acres per pad. The proposed pipeline ROWs would be reclaimed where they do not overlap the access roads.

Interim reclamation activities would be initiated within 120 days of final operations and would take 2 to 4 weeks per well pad.

Abandonment and Final Reclamation

Upon abandonment of the wells, the wellbores would be plugged with cement and the production facilities would be removed. Federal and State of New Mexico standards would be followed, and Encana would provide the BLM with technical and environmental aspects of the final plugging, abandonment, and reclamation procedures. The well pads and access roads would be graded and re-contoured to blend with adjacent natural surroundings as much as practicable, covered with salvaged topsoil material, and seeded to reestablish vegetation. Sediment- and erosion-control measures would be implemented, as necessary.

2.1.1 Design Features

All areas of proposed surface disturbance were inspected in the field to ensure that potential impacts to natural resources would be minimized by implementing design features. For a detailed description of the design and construction practices associated with the proposed action, refer to the APDs in Appendix B. For the proposed action, standard and project-specific design features include, but are not limited to, the following:

- The Crow Mesa Specially Designated Area (SDA) is subject to a seasonal timing limitation on drilling and construction from December 1 through March 31.
- Pre-construction migratory nest surveys will be conducted to identify any active nests within the proposed area of disturbance should construction occur between May 15 and July 31. Surveys need to be conducted 1-3 days prior to construction.
- Roads would be maintained in the same or better condition as existed prior to commencement of operations. Road maintenance will continue until final abandonment and reclamation of the well location. The existing roads will be upgraded back to U.S. Highway 550 or Largo Road.
- Dust emissions will be controlled on the roads and other locations, as necessary, with the application of dust suppressants (e.g., magnesium chloride) and/or water.
- Access roads will be designed and constructed as a Resource Road in accordance with the BLM Gold Book standards (USDI/USDA 2007), BLM 9113-1 (Roads Design Handbook), and BLM 9113-2 (Roads National Inventory and Condition Assessment Guidance and Instructions Handbook). Construction will include ditching, draining, installing culverts, and crowning and capping or sloping and dipping the roadbed, as necessary, to provide a well-constructed and safe road.
- All BLM/FFO cultural resources stipulations will be followed as indicated in the Cultural Resource Records of Review, attached to the Conditions of Approval (COA) in the APD/ROW, as necessary. These stipulations may include, but are not limited to, installation of temporary or permanent fencing or other physical barriers, monitoring earth-disturbing construction, reducing the area of disturbance, establishing specific construction avoidance zones, and educating

employees. The project proponent will inform all project employees, contractors, and sub-contractors 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 Archaeological Resources Protection Act. If a possible cultural resource is discovered during construction, the project proponent will immediately stop all construction activities near the discovery and immediately notify the archaeological monitor, if present, or the BLM. The BLM will then evaluate the site or instigate the site to be evaluated. Should a discovery be evaluated as significant (e.g., per the National Register, Native American Graves Protection and Repatriation Act, Archaeological Resources Protection Act), it will be protected in place until mitigating measures can be developed and implemented according to guidelines set by the BLM.

- Prior to construction, pipeline ROWs will be staked at 100- to 200-foot intervals; when applicable, BLM boundaries will be marked with station numbers at the entrance to and exit from BLM lands.
- Grazing permittees will be notified when construction is scheduled to begin. All hazards to livestock will be fenced or contained.
- All project activities will be confined to permitted areas only.
- Where pipeline construction parallels or crosses public roads, warning signs will be placed to alert motorists of construction. Safety measures also will be implemented along the construction workspace by either using the topsoil or subsoil piles or strung pipe as a barrier. Trenches left open at road crossings will be fenced with orange safety fence and barricades will be installed, if needed.
- Vegetation clearing, topsoil removal, and grading will be limited to the minimum area required for safe and efficient construction.
- Trees larger than 3 inches in diameter will be cut at ground level and de-limbed. Tree trunks and larger branches will be stacked on access road for wood gatherers or taken to the local chapter house for the elders. Stumps will be cut as close to the ground as possible. Stumps and root balls will be hauled to an approved disposal site or stockpiled at the edge of the well pad and buried in the cut slopes of the pad during interim reclamation.
- Trees smaller than 3 inches in diameter, slash, and brush will be chipped, shredded, or mulched and incorporated into the topsoil for later use in interim reclamation.
- Remaining brush will be brush-hogged or scalped at ground level prior to ground disturbance.
- Topsoil will be segregated and stockpiled at the edge of the workspace. Topsoil is defined as the top 6 inches of soil. Vehicle/equipment traffic will be prevented from crossing topsoil stockpiles.
- If the location becomes prone to wind or water erosion, Encana will take appropriate measures to prevent topsoil loss from wind. Such measures may include using tackifiers or water to wet the topsoil stockpile to create a crust across the exposed soil to prevent soil loss.
- Culverts (24 inches to 36 inches) will be installed, as needed, along the new and upgraded access roads from the well pads to the arterial route. Culverts will be sized and installed in accordance with the BLM Gold Book standards (USDI/USDA 2007), BLM 9113-1 (Roads Design Handbook), and BLM 9113-2 (Roads National Inventory and Condition Assessment Guidance and Instructions Handbook).

- A closed-loop system will be used. Cuttings will be stored on-site in aboveground storage tanks. Cuttings will be disposed of at an approved waste disposal facility.
- The closed-loop system storage tanks will be sized to ensure confinement of all fluids and will provide sufficient freeboard to prevent uncontrolled releases.
- A 20-millimeter-thick liner will be installed under tanks, pumps, ancillary facilities, and truck loading/unloading areas associated with the closed-loop system.
- Drilling fluids will be stored on-site in aboveground storage tanks. Upon termination of drilling operations, the drilling fluids will be recycled and transferred to other permitted closed-loop systems or returned to the vendor for reuse, as practical. Residual fluids will be disposed of at an approved waste disposal facility.
- The water-based solution that flows back to the surface during and after completion operations will be placed in storage tanks on location. Flowback water will be confined to a storage tank not more than 90 days after initial production and will be disposed of at an approved waste disposal facility.
- Any spills of non-freshwater fluids will be cleaned up immediately and removed to an approved disposal site.
- Self-contained, chemical toilets will be provided for human waste disposal. The toilet holding tanks will be pumped, as needed, and the contents disposed of in an approved sewage disposal facility. Toilets will be on-site during all operations.
- Garbage, trash, and other waste materials will be collected in a portable, self-contained, and fully-enclosed trash container during drilling and completion operations. Accumulated trash will be removed, as needed, and will be disposed of at an authorized sanitary landfill. No trash will be buried or burned on location.
- Immediately after removal of the drilling rig, all debris and other waste materials not contained in the trash container will be cleaned up and removed from the well location.
- No chemicals subject to reporting under SARA Title III in an amount equal to or greater than 10,000 pounds will be used, produced, stored, transported, or disposed of annually in association with the drilling, testing, or completion of this well.
- No extremely hazardous substances, as defined in 40 CFR 355, will be used, produced, stored, transported, or disposed of in threshold planning quantities in association with the drilling, testing, or completion of this well.
- The amount of open trench will be minimized ahead of pipe laying and backfilling. No more than ½ mile of trench or the amount of trench that can be worked in a day will be open at any given time. Backfilling operations will be performed within a reasonable amount of time of the lowering operation to ensure the trench is not left open for more than 24 hours. Trenches left open overnight will be fenced with a temporary fence or other methods approved by the Authorized Officer. The ends of the trench will be sloped (3:1) to allow animals to escape.
- Escape ramps/crossovers will be constructed every 1,320 feet. In areas where active grazing is taking place, escape ramps/crossovers will be placed every 500 feet. The ends of the open trench will be sloped each night with a 3:1 slope.

- Established livestock and wildlife trails will be left in place as crossovers. Escape ramps/crossovers will be constructed with a minimum 3:1 slope at each end of the crossover. Crossovers will be a minimum of 10 feet wide and not fenced.
- The end of the pipe will be plugged to prevent animals from entering.
- Before the trench is closed, it will be inspected for animals. Any trapped wildlife or livestock will be removed promptly and released at least 150 yards from the trench.
- All existing improvements (e.g., fences, gates, bar ditches) will be repaired to previous or better than pre-construction conditions. Cut fences will be tied to H-braces prior to cutting; openings will be protected during construction, as necessary, to prevent the escape of livestock. A temporary closure will be installed on the same day the fence is cut. Following reclamation, the fence will be reconstructed to BLM specifications.
- Cover from top of pipe to ground level will be a minimum of 36 inches through typical soil and rock and a minimum of 48 inches at drainage of road crossings. Inspection will be conducted to verify that minimum cover is provided, the trench bottom is free of rocks and debris, external pipe coating is not damaged, and the pipe is properly fitted and installed into the ditch.
- Rocks and limbs removed during clearing will be scattered across the workspace in a random arrangement using rubber-tired equipment.
- Open pits will be netted and vent caps placed on all open pipes to prevent birds from entering and nesting.
- If construction is scheduled to begin within the typical migratory bird breeding season of May 15 to July 31, a BLM/FFO-approved bird nest survey will be conducted within the proposed disturbance area.
- Permanent erosion-control measures will be installed after the workspace has been re-contoured. Encana will construct waterbars on all disturbed areas to the spacing and cross sections specified by the Authorized Officer.
- The disturbed areas will be reseeded with a BLM/FFO approved seed mix (in this case, the standard Crow Mesa Piñon-Juniper and Sagebrush Community seed mixes). Refer to Section 3.3 or the site-specific Reclamation Plans prepared for each location and attached to the Surface Use Plan of Operations. Seeding will be accomplished within 120 days of construction completion, weather permitting. Upon evaluation after the second growing season, seeding will be repeated if a satisfactory stand is not obtained. Cut and fill slopes will be hand seeded with hydro-mulch excelsior netting and/or mulch with netting.
- It will be the operator's responsibility to monitor, control, and eradicate all invasive, non-native plant species within the project footprint throughout the life of the proposed project. The operator will contact the BLM/FFO regarding acceptable weed-control methods. If the operator does not hold a current Pesticide Use Permit, a Pesticide Use Permit will be submitted prior to pesticide application. Only pesticides authorized for use on BLM lands will be used. Pesticides will be used in compliance with federal and state laws and only in accordance with their registered use and limitations. The operator will contact the BLM/FFO prior to using these chemicals.
- Production equipment will be placed on location in such a manner to minimize long-term disturbance and maximize interim reclamation. As practical, access will be provided by a teardrop-shaped road through the production area so that the center may be re-vegetated.

- A berm will be constructed completely around any production facilities that contain fluids (e.g., production tanks, produced water tanks). These berms will be constructed of compacted subsoil, corrugated metal, or equivalent; be impervious; and hold 110 percent of the capacity of the largest tank.
- Production facilities will be painted Juniper Green to blend with the natural color of the landscape and will be located, to the extent practical, to reasonably minimize visual impact. Equipment subject to safety considerations would not be painted.
- Engines will be equipped with mufflers; barriers or other soundproofing measures will be implemented, if needed, to meet the requirements of BLM Notice to Lessees and Operators on Onshore Oil and Gas Leases within the jurisdiction of the FFO NTL 03-1 FFO.

Site-Specific Design Features for the Escrito E07-2407

- Encana will pre-seed the pipeline workspace prior to pipeline construction. Upon completion of pipeline construction, the ROW will be reclaimed in a roughened condition and will then be re-seeded. The seed mixture would be the standard Crow Mesa Piñon-Juniper mix (see Section 3.3).
- Encana will conduct a field study to evaluate antelope bitterbrush (*Purshia tridentata*) reestablishment by comparing direct seeding and transplanting methods. Encana will prepare a Transplanting Plan that will provide details for seed collection and planting, extraction and transplanting, and post-construction monitoring and reporting. This plan will be approved by the BLM prior to site construction.
- Encana will work with the BLM to conduct offsite mitigation on 5 acres of land to offset impacts to antelope bitterbrush that has reestablished in the existing Williams Four Corners, LLC pipeline corridor.
- Water will be diverted around the pad and silt traps installed as needed upon interim reclamation.

Site-Specific Design Features for the Escrito D14-2407

- Encana will conduct a pilot test to determine the feasibility of utilizing a three-phase gathering system.
- Encana will pre-seed the pipeline workspace prior to pipeline construction. Upon completion of pipeline construction, the ROW will be reclaimed in a roughened condition and will then be re-seeded. The seed mixture would be the standard Crow Mesa Sagebrush-Grass and Crow Mesa Piñon-Juniper mixes (See Section 3.3).
- Encana will purchase and deliver a 2,200-gallon guzzler to the BLM. The BLM will install the guzzler at a location to be determined.
- The stock tank adjacent to the well pad will be cleaned out. An archaeological monitor will be present during this operation.
- The stock tanks along the existing access road will be cleaned out. An archaeological monitor will be present during these operations.
- Water will be diverted around the pad and silt traps installed as needed upon interim reclamation.
- Corner 5 will be rounded.
- Corner 3 will be high-walled.
- A tree screen will be left in place along the northwest edge of the pad near the existing pond.

Site-Specific Design Features for the Escrito L14-2408

- Encana will pre-seed the pipeline workspace prior to pipeline construction. Upon completion of pipeline construction, the ROW will be reclaimed in a roughened condition and will then be re-seeded. The seed mixture would be the standard Crow Mesa Sagebrush-Grass mix.
- Encana will install a locking gate and/or exclusion fencing to restrict access to the area. Exact placement of the locking gate and/or exclusion fencing will be determined by the BLM.
- Water will be diverted around the pad and silt traps installed as needed upon interim reclamation.
- The cut slope will be high-walled between corner 2 and 3 during construction and drilling.

2.2 No Action

The BLM NEPA Handbook (H-1790-1; USDI/BLM 2008a) states that for EAs on externally initiated proposed actions, the no action alternative is generally to reject the proposal or deny the application. This option is provided in 43 CFR 3162.3-2 (h) (2). This alternative would deny the approval of the APDs and ROW grants and the current land and resource uses would continue to occur in the area. The no action alternative provides a useful baseline for comparison of environmental effects (including cumulative effects) and demonstrates the consequences of not meeting the need for the action.

2.3 Alternatives Considered but Eliminated

Several configurations of the proposed well pads, pipelines, and roads were considered and evaluated by the applicant, BLM, and natural and cultural resources experts using desktop tools and in-field examination. These alternatives were considered but have been eliminated from further consideration as they would have resulted in greater environmental impacts.

Escrito L14-2408

The Escrito L13-2408 location was moved approximately 1 mile to the west and is now the proposed L14-2408. The well pad would have been located at approximately 1,320 FSL and 250 FWL of Section 13, Township 24 North, Range 8 West. The Escrito L13-2408 was designed as a one well location, by moving the location, four wells are now proposed to be drilled from the pad thereby minimizing disturbance and consolidating development.

Escrito D14-2407

The initial staking of this location (1,080 FSL and 250 FWL in Section 13) was moved to avoid sensitive natural resources.

Escrito E07-2407

The Escrito H12-2408 location is being proposed as the E07-2407. The ideal location was originally a two-well pad in Section 8, Township 24, Range 7 West. The following locations were considered but rejected for the reasons outlined below.

- Option 1 (1700 FNL, 450 FWL) – 20 to 40 foot cuts; extensive disturbance and construction
- Option 2 (1800 FNL, 150 FWL) – 10 to 15 foot cuts/fills and 500 foot side hill; cultural sites in area
- Option 3 (1600 FNL, 200 FEL in Sec 17) – cultural sites

- Option 4 (2400 FNL, 400 FWL) – 10 to 20 foot cuts rough topography
- Option 5 (300 FNL, 600 FWL) – 10 to 20 foot cut/fills, 3000 feet of new access
- Two locations in Section 6 were also reviewed, but rejected because of cultural resources

Alternatives were also evaluated to determine the feasibility of liquid storage consolidated facilities to reduce truck traffic, wear and tear on roads, disturbance to wildlife, and surface disturbance. Consolidated facilities for the Escrito L14-2408 were considered; however, this location was formerly proposed as the Escrito L13-2408, a two well pad. The well pad was moved and proposed as a four-well location. Drilling up to four wells on this location would reduce impacts.

The Escrito E07-2407 was considered for consolidated facilities; however, this location is not considered suitable for consolidated facilities for several reasons:

- The well is exploratory in nature and commercial viability of drilling wells in this area has not yet been demonstrated.
- The location is proposed as a four well pad, which would reduce impacts.
- The location is adjacent to a major road in the area.
- It would be difficult to run a liquids gathering system or three-phase gathering system from this pad to another pad in this early phase of exploration. The Escrito L14-2408 pad is several miles away across some challenging terrain, which would require greater surface disturbance. The greater pipeline length also increases the risk of pipeline blockage with paraffin formation.

No other alternatives were identified that would create less disturbance and still achieve the purpose and need of the proposed action.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the environment that would be affected by implementation of the alternatives described in Chapter 2. Aspects of the affected environment described in this section focus on the relevant major resources or issues.

Under the no action alternative, the proposed action would not be implemented. The no action alternative would result in the continuation of the current land and resource uses in the analysis area. This alternative will not be evaluated further in this EA.

Field resource investigations of the proposed action were conducted on October 16 and December 3, 2013 and February 6, 2014 by Ecosphere Environmental Services (Ecosphere) biologists. Cultural resource surveys were conducted by La Plata Archaeological Consultants, LLC (LAC) between July 2012 and March 2014. On-sites were conducted on November 20, 2013, February 12 and 26, 2014 and attended by representatives from Encana, Ecosphere, and the BLM/FFO.

The analysis area for this EA is defined as the project footprint of the proposed well pads, access roads, and pipelines.

3.1 Air Resources

3.1.1 Affected Environment

The proposed project would be located in Rio Arriba and San Juan counties, New Mexico. Additional general information on air quality in the area is contained in Chapter 3 of the Farmington PRMP/FEIS. In addition, new information about greenhouse gases (GHGs) and their effects on national and global climate conditions has emerged since this document was prepared. Ongoing scientific research identified the potential impacts of GHG emissions such as carbon dioxide (CO_2), methane (CH_4), nitrous oxides (NO_X), water vapor, and several trace gases on the 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 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 the Air Quality Technical Report; USDI/BLM 2013). 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 United States Environmental Protection Agency (USEPA) has the primary responsibility for regulating air quality, including six nationally regulated ambient air pollutants (criteria pollutants): carbon monoxide (CO), nitrogen dioxide (NO_2), ozone, particulate matter between 2.5 and 10 micrometers in

diameter (PM_{10}), particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$), sulfur dioxide (SO_2), and lead. The USEPA has established National Ambient Air Quality Standards (NAAQS) for criteria air pollutants to protect human health and the environment. The USEPA has approved the New Mexico's State Implementation Plan and New Mexico enforces state and federal air quality regulations on all public and private lands within the state, except for tribal lands within Bernalillo County. Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology, and terrain; included are 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 USEPA 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 Quality Technical Report presents the types of data used for describing the existing conditions of criteria pollutants, how criteria pollutants are related to activities involved in oil and gas development, and providing a table of current national and state standards (USDI/BLM 2013). The USEPA Green Book web page reports that all counties in the analysis area—San Juan, McKinley, Rio Arriba, and Sandoval counties in New Mexico and La Plata County, Colorado—are in attainment of all NAAQS, as defined by the Clean Air Act. The area also does not violate any New Mexico Ambient Air Quality Standards (NMAAQS). The current criteria pollutant "design concentrations" in the analysis area are described below. Design concentrations are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. Table 3-1 shows monitored design values for ozone in recent years for each of the three San Juan County ozone monitoring stations.

Table 3-1. Reported ozone values for San Juan County ozone monitoring stations

State Air Monitoring Station	8-hour Ozone Design Value (parts per million)				NAAQS
	2007-2009	2008-2010	2009-2011	2010-2012	2008
Substation	0.067	0.063	0.063	0.067	0.075
Bloomfield	0.061	0.060	0.061	0.067	0.075
Navajo Lake	0.069	0.066	0.068	0.071	0.075

Note: NAAQS = National Ambient Air Quality Standards

Source: USEPA 2012

Table 3-2 summarizes monitored design values for other criteria pollutants in San Juan County.

Table 3-2. Criteria pollutant design value concentrations monitored in San Juan County

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

Note: NAAQS = National Ambient Air Quality Standards; NMAAQS = New Mexico Ambient Air Quality Standards; NO_2 = nitrogen dioxide; ppb = parts per billion; µg/m^3 = micrograms per cubic meter; ppm = parts per million; PM_{10} = particulate matter between 2.5 and 10 micrometers in diameter; $PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter

Source: USEPA 2012

[1] 98th percentile, averaged over 3 years.

[2] Not to be exceeded more than once per year.

[3] µg/m^3 refers to micrograms per cubic meter of air. Not to be exceeded more than once per year, on average over 3 years.

[4] The NMAAQS is a standard for total suspended particulate matter.

[5] Annual mean, averaged over 3 years.

[6] 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.

In 2005, the USEPA estimated that less than 0.01 ton of lead per square mile was emitted in the analysis area, which is less than 2 tons total (USDI/BLM 2013). Lead and CO are not monitored in northwestern New Mexico. However, concentrations of these pollutants are expected to be low in rural areas; therefore, not monitored.

Hazardous Air Pollutants

The Air Quality Technical Report discusses the relevance of hazardous air pollutants (HAPs) to oil and gas development and the particular HAPs that are regulated in relation to these activities (USDI/BLM 2013). The USEPA has identified 187 toxic air pollutants as HAPs. In March 2011, the USEPA published the fourth in a series of National Scale Air Toxics Assessments (NATA) that quantifies HAP emissions for 2005 by U.S. counties. The purpose of the NATA is to identify areas where HAP emissions result in high health risk. Computer models are used to develop estimates of risk of cancer or other health impacts. NATA presents risk hazard indices for cancer and neurological and respiratory problems for each county and census tract. Because techniques have changed over the years, the NATA are not comparable to those previously issued. USEPA also cautions that because data availability varies from state to state, the results are not necessarily comparable from one geographic area to another. The 2005 NATA estimated the total cancer risk for the analysis area as 25 to 50 per one million and the estimated tract level total respiratory hazard index was 0 to 1. The USEPA estimates the average national cancer risk for 2005 was 50 per one million, meaning 1 person out of every 20,000 had an increased likelihood of contracting cancer from breathing air toxics from outdoor sources if exposed to 2005 emission levels over their lifetime. A

respiratory hazard index below 1 indicates that exposures in the area do not exceed reference levels that would have adverse effects on human health.

Climate

The analysis area is located in a semi-arid climate regime, typified by dry windy conditions and limited rainfall. Summer maximum temperatures generally are in the range of 80 or 90 degrees Fahrenheit (°F), and winter minimum temperatures generally are in the teens to 20s. Temperatures occasionally reach above 100°F in June and July, and have dipped below 0°F in December and January. Precipitation is divided between summer thunderstorms associated with the southwest monsoon and winter snowfall as Pacific weather systems drop south into New Mexico.

Table 3-3 shows climate normals for the 30-year period from 1981 to 2010 for the Farmington, New Mexico area.

Table 3-3. Climate normals for the Farmington area, 1981-2010

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

Source: USDI/BLM 2013

[1] degrees Fahrenheit

3.1.2 Impacts from the Proposed Action

Methodology and assumptions for calculating air pollutant and GHG emissions are described in the Air Resources Technical Report (USDI/BLM 2013). 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, HAPs, and GHG emissions to be compared to regional and national emissions levels (USDI/BLM 2013). Also incorporated into this document are the sections describing the assumptions used in developing the inputs for the calculator (USDI/BLM 2013).

Direct and Indirect Impacts

Criteria Pollutants

Table 3-4 shows estimated emissions from one proposed horizontal oil well for criteria pollutants, volatile organic compounds (VOCs), and GHGs (USDI/BLM 2013). For comparison, Table 3-5 shows total human-caused emissions for each of the counties in the BLM/FFO and La Plata County, Colorado, based on USEPA's 2008 emissions inventory (USEPA 2011).

Table 3-4. Criteria pollutant and volatile organic compound emissions estimated for construction of one horizontal oil well (average 25 days to drill and complete)

Activity	NO_X	CO	VOCs	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2
One-time operations (tons)								
Construction	5.5	1.5	0.5	2.5	0.25	0.1	0.007	598.85
Completion	0.5	0.1	0.03	0.025	0.025	-	-	55.00
Interim Reclamation	0.006	0.006	0.006	0.001	-	0.003	-	1.24
Final Reclamation	0.006	0.006	0.006	0.001	-	0.004	-	1.66
Ancillary Operations (tons)								
Workover	0.129	0.04	0.01	0.01	0.01	-	-	10.59
Road Maintenance	-	-	-	-	-	-	-	0.26
Road Traffic	-	-	-	-	-	-	-	0.06
Annual operations (tons/year)								
Oil Haul Truck and Small Truck (100 bbl/day)	0.009	0.006	0.0012	0.0009	0.0008	-	0.0001	3.88
Total	**6.13**	**1.64**	**0.55**	**2.54**	**0.29**	**0.11**	**0.01**	**671.54**

Note: NO_X = nitrous oxides; CO = carbon monoxide; VOCs = volatile organic compounds; PM_{10} = particulate matter between 2.5 and 10 micrometers in diameter; $PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter; SO_2 = sulfur dioxide; CH_4 = methane; CO_2 = carbon dioxide; bbl = barrels per day

Source: USDI/BLM 2013

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

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

Table 3-5. Analysis area human-caused emissions in tons/year, 2008

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

Note: NO_X = nitrous oxides; CO = carbon monoxide; VOC = volatile organic compounds; PM_{10} = particulate matter between 2.5 and 10 micrometers in diameter; $PM_{2.5}$ = particulate matter with less than 2.5 micrometers in diameter; SO_2 = sulfur dioxide

Source: USEPA 2008

Table 3-6 displays the percent increase in total emissions in the analysis area from the proposed action to construct and operate one horizontal oil well.

Table 3-6. Percent increase in analysis area emissions per well

	NO_X	CO	VOCs	PM_{10} (1)	$PM_{2.5}$ (1)	SO_2 (1)
Total Emissions tons/year	57,303.4	147,078.1	160,079.0	218,800.3	23,897.3	13,343.3
Horizontal Oil Well Emissions tons/year	6.13	1.64	12.55 (2)	2.54	0.29	0.11
Percent Increase	**0.011**	**0.0011**	**0.0078**	**0.0012**	**0.0012**	**0.00082**

Note: NO_X = nitrous oxides; CO = carbon monoxide; VOC = volatile organic compounds; PM_{10} = particulate matter between 2.5 and 10 micrometers in diameter; $PM_{2.5}$ = particulate matter with less than 2.5 micrometers in diameter; SO_2 = sulfur dioxide

[1] Values derived from average emissions for any well drilling in the analysis area. Calculated results available upon request.

[2] Current USEPA regulations require operators to reduce VOC emissions by 95 percent if their oil storage tanks emit over 6 tons of VOC emissions per year.

Hazardous Air Pollutants

The formulas used for calculating HAPs are very imprecise. For many processes, it is assumed that HAP emissions will be equivalent to 10 percent 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 USEPA regulations require operators to reduce VOC emissions by 95 percent if their oil storage tanks emit over 6 tons of VOC emissions per year. A reduction of 95 percent of oil storage tank VOC emissions would reduce the estimated HAP emissions to 0.12 ton/year.

Total Greenhouse Gases

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

Cumulative Impacts

The BLM/FFO manages federal hydrocarbon resources in San Juan, Sandoval, Rio Arriba, and McKinley counties in New Mexico. There are approximately 23,522 wells in the San Juan Basin. About 16,435 of the wells in these counties are federal wells. Analysis of cumulative impacts for the reasonable development scenario of oil and gas wells on public lands managed by 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 (USDI/BLM 2013).

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 (USDI/BLM 2013). 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 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 (USDI/BLM 2013) 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.

3.2 Water Resources/Quality – Surface and Groundwater

3.2.1 Affected Environment

The analysis area is located in the Upper Colorado River Hydrologic Region. The proposed Escrito L14-2408 well pad, access road, and pipeline would be located within the Blanco sub-watershed, while the Escrito E07-2407 and D14-2407 well pads, access roads, and pipelines would be within the Largo sub-watershed. The sub-watersheds and proposed well pad locations are shown on Figure 6 (Appendix A). Surface water from the proposed Escrito L14-2408 location would flow west-northwest into Blanco Canyon via several ephemeral drainages, including Crow Canyon. The proposed Escrito E07-2407 and D14-2407 locations drain into Largo Canyon via Rockhouse Canyon and Rincon Largo.

There are no perennial surface water resources such as rivers, lakes, or streams, nor any wetlands or springs within the analysis area.

Big Blue Pond, a seasonal wildlife water source, is located in the northwestern corner of the proposed Escrito D14-2407 well pad construction zone. An unnamed seasonal pond is located approximately 700 feet and upslope of the proposed Escrito D14-2407 pipeline alignment end of the line. Another seasonal pond is located near pipeline Escrito D14-2407 Station 62+95. A wildlife guzzler is located approximately 1,500 feet south and 1,900 feet west of the proposed Escrito D14-2407 pipeline. The Crow Canyon Pond #2—a seasonal pond—is located approximately 260 feet south of the proposed Escrito L14-2408 pipeline ROW.

The analysis area was surveyed for the presence of jurisdictional wetlands and other waters of the U.S. Where the proposed project would potentially impact "bluelines," as obtained from the USGS High-resolution National Hydrography Dataset (NHD), a field determination was made on whether the drainage feature supported a defined bed-and-bank feature (based on scour and deposition processes). If scour and deposition features were present, an assessment was made to determine which geomorphic features were representative of an ordinary high water mark. Waters of the U.S. and other wetlands are regulated by the U.S. Army Corps of Engineers. Table 3-7 provides a description of potential jurisdictional waters of the U.S. that were identified in the analysis area.

Table 3-7. Potential jurisdictional waters of the U.S. in the analysis area

Project Component	Location		Ordinary High Water Mark		Type
	Latitude	Longitude	Width (Inches)	Height (Inches)	
Escrito D14-2407	36.322545	-107.542229	10	1	Ephemeral
	36.320617	-107.532802	35	2	Ephemeral
	36.319489	-107.533261	15	1	Ephemeral
	36.318294	-107.534198	25	2	Ephemeral
	36.318827	-107.534993	48	1	Ephemeral
	36.318635	-107.535665	25	1	Ephemeral
	36.318316	-107.536752	40	1	Ephemeral
	36.317164	-107.536342	25	1	Ephemeral
	36.31714	-107.535404	60	4	Ephemeral
Escrito E07-2407	36.331242	-107.625915	10	1	Ephemeral
	36.331762	-107.626398	8	1	Ephemeral
	36.331473	-107.622593	25	2	Ephemeral
	36.330888	-107.619604	48	3	Ephemeral
	36.330817	-107.618947	30	2	Ephemeral
	36.330634	-107.617723	30	3	Ephemeral
	36.330528	-107.616833	60	3	Ephemeral

Project Component	Location		Ordinary High Water Mark		Type
	Latitude	Longitude	Width (Inches)	Height (Inches)	
	36.330147	-107.615148	75	4	Ephemeral/NHD blueline
Escrito L14-2408	36.310183	-107.661611	36	4	Ephemeral
	36.309666	-107.660983	36	4	Ephemeral
	36.311274	-107.661341	12	1	Ephemeral
	36.311812	-107.659866	50	3	Ephemeral/NHD blueline
	36.312619	-107.661366	60	4	Ephemeral/NHD blueline
	36.315626	-107.668915	14	1	Ephemeral
	36.317882	-107.676081	14	2	Ephemeral
	36.317996	-107.676832	10	1	Ephemeral
	36.318035	-107.679931	12	1	Ephemeral
	36.317921	-107.680613	12	1	Ephemeral
	36.318249	-107.682138	48	3	Ephemeral
	36.318326	-107.683147	15	1	Ephemeral
	36.318503	-107.683854	35	2	Ephemeral
	36.318745	-107.685028	18	2	Ephemeral
	36.319685	-107.690919	24	1	Ephemeral
	36.319898	-107.691942	12	1	Ephemeral
	36.318112	-107.681802	180	5	Ephemeral/NHD blueline

Aquifers in the San Juan Basin generally are considered to be confined and artesian due to the overlying low hydraulic conductivity formations and the regional geologic structure. Groundwater recharge occurs along the topographic high outcrops along the basin margins. Discharge from groundwater aquifers generally occurs in topographic low areas such as the San Juan River in the northwestern part of the basin and the Rio Grande in the southeast (Stone et al. 1983).

The primary aquifers in the BLM/FFO area are the sandstone-based Uinta-Animas and the Mesaverde. Groundwater is readily available in most of the BLM/FFO area and is of fair to poor quality. A search of the New Mexico State Engineers Office—Water Administration and Technical Engineering Resource System database for the analysis area and vicinity (1-mile radius) was performed. There are no water wells located within a 1-mile radius of the analysis area (NMOSE 2013).

3.2.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Potential impacts to surface water and shallow groundwater resources could occur from stormwater runoff and the accidental spill of chemicals, produced water, or flowback fluids. The potential for these impacts would be long term for the life of the proposed action.

The proposed action would temporarily expose an estimated 54.9 acres of soil as a sediment source entering area drainage ways in the short term. After interim reclamation, approximately 7.1 acres would remain exposed at well pads and access roads for the long term. Vegetation cover is low to moderate throughout the project footprint. Soils also tend to be shallow in the proposed Escrito D14-2407 and E07-2407 project footprints. Exposure of soils, particularly on slopes, would lead to an increase in an undetermined, but likely small, amount of sediment transport—particularly during and following storm events. Slight alterations in drainage patterns also may lead to an increase in sediment transport. These increases in sediment transport would persist for several years until the disturbed areas are stabilized. The potential for sediment transport into drainages would be minimized through implementation of best management practices and other preventive measures, such as re-establishment of vegetation and proper site hydrological diversions.

The disturbance created by the proposed well pads, access roads, and well-tie pipelines within the ordinary high water mark of waters of the U.S., would be covered under the U.S. Army Corps of Engineers Nationwide Permits #12 (for Utility Line Activities), #14 (Linear Transportation Crossings), or Permit #39 (for Commercial and Institutional Developments). Encana would coordinate with the U.S. Army Corps of Engineers and provide pre-construction notifications, if required, prior to disturbance.

Water for drilling and completions would be sourced from a private water well that has been permitted by the state of New Mexico. The well has been assigned the POD Number SJ 01979-S4 by the New Mexico Office of the State Engineer. Approximately 1.3 million gallons of water would be used for drilling and completions per well.

Minimal amounts of hazardous materials (e.g., gas, diesel) would be used and stored on the well pad locations. There would be the potential for accidental spills or releases of these materials that could impact local water quality. The proposed wells would be drilled using a closed-loop system to contain drill cuttings and fluids. All chemicals stored on-site would be properly contained. Containment structures sufficiently impervious to prevent a discharge to waters of the U.S., such as containment dikes, containment walls, drip pans, or equivalent protective structures, would be installed and maintained. Any spills of non-freshwater fluids would be cleaned up immediately and removed to an approved disposal site in accordance with federal and state regulations.

Stimulation (i.e., hydraulic fracturing or “fracking”) is a process used to maximize the extraction of underground resources by allowing hydrocarbons to move more freely from the rock pores to production wells that bring the hydrocarbons to the surface. Fluids, commonly made up of water (99 percent) and chemical additives (1 percent), are pumped into a geologic formation at high pressure during hydraulic fracturing (USEPA 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 wellbore, and may occasionally extend up to 1,000 feet from the wellbore. 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 (USEPA 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 wellbores 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.

Potential impacts to groundwater resources could occur from the proposed wellbores. The potential for impacts to groundwater from the wellbores would be long term for the life of the wells. Adherence to the COA and design features, such as adequate casing, cementing, and other drilling and completion methods, would minimize effects to water quality.

Casing specifications would be designed by Encana and a casing program would be submitted to the New Mexico Oil Conservation Division. Surface casing would be set to 500 feet. The casing and cementing would stabilize the wellbore and provide protection to any overlying freshwater aquifers by isolating hydrocarbon zones from overlying freshwater aquifers. Prior to approving an APD, a BLM geologist would identify all potential subsurface formations that would be penetrated by the wellbore. This includes all groundwater aquifers and any zones that would present potential safety or health risks that may need special protection measures during drilling, or that may require specific protective well construction measures.

Once the geologic analysis is completed, the BLM would review the company’s proposed casing and cementing programs to ensure the well-construction design is adequate to protect the surface and subsurface environment, including potential risks identified by the geologist and all known or anticipated zones with potential risks.

During drilling, the BLM would be on location during the setting of critical casing and cementing intervals. Before hydraulic fracturing takes place, all surface casings and some deeper, intermediate zones must be cemented from the bottom of the cased hole to the surface. The cemented well would be pressure tested to ensure there are no leaks and a cement bond log would be run on certain strings of casing to ensure the cement has bonded to the casing and the formation.

During operation, the proposed pipelines could potentially leak or rupture, which could impact groundwater quality. The proposed pipelines would be tested to ensure integrity prior to operation. Cathodic protection systems would be installed to protect the pipelines from corrosion, which could affect the integrity of the pipe. Potential impacts to groundwater quality from leaks or ruptures during pipeline operation would be long term.

Cumulative Impacts

Reasonably foreseeable development within the Blanco sub-watershed may include an estimated additional 677 oil and gas wells and related facilities. Surface-disturbing activities associated with these actions may affect an estimated 2,514 acres. Reasonably foreseeable development within the Largo sub-watershed may include an estimated additional 810 oil and gas wells and related facilities. Surface-disturbing activities associated with these actions may affect an estimated 6,756 acres (USDI/BLM 2003a, page 4-7). The PRMP/FEIS determined that the primary cumulative impacts on water quality would result from surface disturbance, which would generate increased sediment yields (USDI/BLM 2003a, pages 4-123 and 4-124). Cumulative effects to water resources from the proposed action would be maximized shortly after construction begins and would decrease over time as reclamation efforts progress.

The proposed action would cumulatively contribute approximately 3.7 acres of long-term disturbance in the Blanco sub-watershed and 3.4 acres of long-term disturbance in the Largo sub-watershed. Cumulative impacts to surface waters would be related to short-term sedimentation or flow changes. Surface-disturbing activities other than the proposed action that may cause accelerated erosion include (but are not limited to) construction of roads or other facilities, installation of trenches for utilities, road maintenance such as grading or ditch-cleaning, public recreational activities, vegetation manipulation and management, prescribed and natural fires, and livestock grazing.

3.3 Upland Vegetation and Noxious Weeds

3.3.1 Affected Environment

The proposed Escrito E07-2407 would be located in a moderately dense piñon-juniper woodland dominated with piñon pine (*Pinus edulis*) and Utah Juniper (*Juniperus osteosperma*). There are approximately 1,200 piñon pine and Utah juniper trees located in the proposed project footprint. The woodland contains multi-age trees with a relatively high ratio of young trees with diameter at breast height less than 6 inches. A number of standing snags occur in the woodland along with downed wood. Litter cover was visually estimated to average 10 percent. Canopy cover is variable and ranges from approximately 30 to 60 percent. In high canopy areas, the understory is dominated by antelope bitterbrush and mountain mahogany (*Cerocarpus montanus*). In less dense areas, big sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Ericameria nauseosa*), and broom snakeweed (*Gutierrezia sarothrae*) dominate the understory. Understory cover was visually estimated at 20 to 35 percent. No noxious weeds were observed.

Two vegetation communities occur in the Escrito D14-2407 project footprint—sagebrush grassland and piñon-juniper woodland. Forage enhancement projects have occurred in the Crow Mesa SDA since 2007 and are ongoing. The Blue Dixie Harrow project is located in the northeastern portion of the proposed

well pad construction zone and north of County Road 508, adjacent to the proposed pipeline alignment for approximately 3,000 feet. The final approximately 500 feet of the proposed pipeline would be located in the Upper Rincon Spike treatment area. Sagebrush grassland in the area has been mechanically or chemically treated to decrease the amount of sagebrush and increase palatable browse and early spring/summer herbaceous forage. Dominant species in this vegetation community include big sagebrush, blue grama (*Bouteloua gracilis*), antelope bitterbrush, and galleta (*Pleuraphis jamesii*). The piñon-juniper woodland is generally open canopy with some standing snags and a moderate cover of debris and downed wood. Canopy cover typically ranges from 15 to 25 percent. Approximately 600 to 650 piñon and juniper trees of various age and size are located within the proposed project footprint. Soils tend to be shallow in the woodland areas and limit understory growth. The woodland understory is dominated by big sagebrush, antelope bitterbrush, broad leaf yucca (*Yucca baccata*), and rabbitbrush (*Chrysothamnus depressus*). Understory vegetation is patchy and ranges from 15 to 30 percent. No noxious or invasive weed species were observed.

The proposed Escrito L14-2408 well pad, access road, and pipeline ROW is dominated by big sagebrush, blue grama, and James' galleta. Scattered piñon and juniper trees occur in the proposed well pad and in a few patchy areas along the western extent of the proposed access road; in all, approximately 80 to 100 trees occur in the project footprint. Ground cover ranges between 50 and 60 percent; areas with scattered piñon and juniper trees in the northeast are more sparsely vegetated. Approximately 3,900 feet of the proposed well-tie pipeline crosses the Crow Lake Spike vegetation treatment area. One noxious weed species was observed in a patch approximately 10 by 20 feet along the proposed access road. Halogeton (*Halogeton glomeratus)* is a State of New Mexico-listed and BLM-listed Class B species. New Mexico Class B noxious weeds are limited to portions of the state. Management decisions for these species are determined at the local level, based on feasibility of control and level of infestation (NMDA 2009).

3.3.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Direct impacts would include removal of vegetation during site-clearing activities. Construction of the proposed action would result in removal and modification of approximately 54.91 acres of vegetation, 14.3 of which are previously disturbed, and would remove an estimated 1,880 to 1,950 piñon and juniper trees within the analysis area (three locations). Tree trunks and larger branches will be stacked on access road for wood gatherers or taken to the local chapter house for the elders. Potential impacts pertain to changes in species composition and density, and an increased potential for invasive species to establish. These impacts would affect approximately 5.4 acres of the Blue Dixie Harrow, Upper Rincon Spike, and Crow Lake Spike habitat improvement areas in the Crow Mesa SDA. Impacts to these habitat improvement areas would be minimized since, with the exception of the segment of the proposed Escrito D14-2407 pipeline that extends into the Upper Rincon Spike treatment area, disturbance would be adjacent to existing roads or pipeline corridors.

Following reclamation, there would be long-term changes in the density and composition of the vegetation communities in the analysis area. Trees may not re-establish in the area for several decades. Disturbed areas would be expected to re-vegetate in 2 or more years. With the implementation of design features, there would be short-term impacts to habitat improvement areas within the Crow Mesa SDA.

There would be a long-term loss of approximately 7.1 acres of vegetation for project access and operation.

Invasive species generally are tolerant of disturbed conditions, and disturbed soils at project sites may provide an opportunity for the introduction and establishment of non-native invasive species. During construction and operation, noxious weed sources could be introduced to disturbed areas from vehicles, equipment, people, wind, water, or other mechanisms. There would be a long-term potential for non-native invasive weeds to establish in the area. Encana would be responsible for monitoring and controlling any non-native invasive weed species within the ROWs and well pads for the life of the project.

To better promote successful reclamation, Encana would pre-seed the pipeline workspace prior to pipeline construction. This design feature would increase the amount of viable seed in soils prior to disturbance. Upon completion of pipeline construction, the ROWs would be reclaimed in a roughened condition and would then be re-seeded. Encana would conduct a field study to evaluate antelope bitterbrush reestablishment by comparing direct seeding and transplanting methods. Additionally, offsite mitigation would be conducted on 5 acres of land to offset impacts to antelope bitterbrush that has reestablished in the existing pipeline corridor.

Re-vegetation of the well pad construction zones and the pipeline ROWs would be initiated by Encana within 120 days of well completion and pipeline construction. All vegetation removed during site-clearing activities would be mowed and incorporated into stockpiled topsoil. Trees that are 3 inches or greater in diameter would be cut and de-limbed. The area would be reseeded the standard Crow Mesa Piñon-Juniper (Table 3-8) or Sagebrush-Grass seed mixes (Table 3-9), depending on habitat type.

Table 3-8. Standard Crow Mesa Pinyon-juniper Community seed mix Persistent

Common Name	Scientific Name	Variety	Season	Form	PLS lbs/acre[1]
Antelope Bitterbrush	*Purshia Tridentata*	VNS	Cool	Shrub	2.0
Western Wheatgrass	*Pascopyrum Smithii*	Arriba	Cool	Sod	2.0
Needleandthread	*Hesperostipa Comata*	VNS	Cool	Bunch	3.0
Indian Ricegrass	*Achnatherum Hymenoides*	Paloma or Rimrock	Warm	Bunch	3.5
Blue Grama	*Bouteloua Gracilis*	Alma or Hachita	Warm	Bunch	2.0
Sand Dropseed	*Sporbolus Cryptandrus*	VNS	Warm	Bunch	0.5
Muttongrass	*Poa Fendleriana*	VNS	Cool	Bunch	2.0
Scarlet Globemallow	*Sphaeralcea Coccinea*	VNS	Warm	Forb	0.25
Small Burnet	*Sanguisorba minor*	Delar	Cool	Forb	1.0
Rocky Mtn Bee Plant	*Cleome serrulata*	Local Collection	Cool	Forb	1.0
Blue Flax	*Linum lewisii*	Appar	Cool	Forb	0.5

[1]Based on 60 pure live seeds (PLS) per square foot, drill seeded; double this rate (120 PLS per square foot) if broadcast or hydro-seeded; "lbs" refers to pounds.

Table 3-9. Standard Crow Mesa Sagebrush/grass Community seed mix

Common Name	Scientific Name	Variety	Season	Form	PLS lbs/acre[1]
Four-wing Saltbush	*Atriplex canesens*	VNS	Cool	Shrub	2.0
Winterfat	*Krascheninikova lanata*	Native	Cool	Shrub	2.0
Indian Ricegrass	*Achnatherum hymenoides*	Paloma or Rimrock	Cool	Bunch	4.0
Blue Grama	*Bouteloua*	Alma	Warm	Sod-forming	2.0
Western Wheatgrass	*Pascopyrum smithii*	Arriba	Cool	Sod-forming	4.0
Small Burnet	*Sanguisorba minor*	Delar	Cool	Forb	2.0
Rocky Mtn. Bee Plant	*Cleome serrulata*	Local collection	Cool	Forb	0.25
Blue Flax	*Linum lewisii*	Appar	Cool	Forb	0.25

[1]Based on 60 pure live seeds (PLS) per square foot, drill seeded; double this rate (120 PLS per square foot) if broadcast or hydro-seeded; "lbs" refers to pounds.

Cumulative Impacts

Within the BLM/FFO planning area, there are approximately 435,500 acres of Great Basin desert scrub and 633,400 acres of piñon-juniper woodland (USDI/BLM 2003a, page 3-31). Based on the acres of plant community types within the planning area and the estimated total disturbance of future activities, less than 1 percent of the Great Basin desert scrub and less than 1 percent of the piñon-juniper woodland vegetation communities than would be disturbed within the planning area over 20 years from reasonably foreseeable future actions (USDI/BLM 2003a, page 3-31 and 4-7). The proposed action would cumulatively contribute 7.1 acres of long-term vegetative disturbance in the planning area.

3.4 Wildlife

3.4.1 Affected Environment

There are no unique wildlife habitats within the analysis area. The proposed action is located within the Crow Mesa SDA. Management in the SDA is focused on protecting big game and their habitat. The SDA totals 38,252 acres, of which 34,264 are federal mineral acres.

Management prescriptions for the SDA include:

- A seasonal timing limitation on drilling and construction from December 1 through March 31.
- Allow ROWs on a case-by-case basis with special management constraints and mitigation.
- Allow limited firewood collection.
- Manage browse species such as antelope bitterbrush, big sagebrush, and mountain mahogany (*Cercocarpus montanus*) to provide for fall/winter use of deer. Maintain adequate herbaceous forage for elk use yearlong and spring/summer deer use.
- Implement wildlife habitat improvement projects.

Crow Mesa provides habitat for a variety of wildlife species and is home to resident populations of mule deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*) (USDI/BLM 2003a). Sign (burrows, tracks, and scat) from mule deer, black-tailed jackrabbit (*Lepus californicus*), woodrat (*Neotoma* sp.), desert cottontail (*Sylvilagus audubonii*), and coyote (*Canis latrans*) was observed during the biological surveys.

A small herd of elk was seen about 0.5-mile north of the proposed Escrito L14-2408 location during the biological surveys.

Comprehensive big game surveys covering the entire Crow Mesa SDA had not been flown prior to the winter of 2008. In January 2008, there were 77 deer (22 bucks, 37 does, and 18 fawns) observed during surveys conducted by the New Mexico Department of Game of Fish (USDI/BLM 2008b). Aerial surveys of Game Management Unit 2C, which encompasses Crow Mesa SDA, were conducted in December 2013. During those surveys, there were 215 deer (39 bucks, 130 does, and 46 fawns) counted for the areas flown.

As of 2008, 12 browse studies have been conducted within the Crow Mesa SDA. Five of these found the browse to be in satisfactory condition, while seven were in unsatisfactory condition. Extensive forage enhancement projects designed to increase the amount of early spring/summer herbaceous vegetation as well as browse began in the fall of 2007 (USDI/BLM 2008b). Since that time, approximately 1,365 acres of habitat have been treated within the Crow Mesa SDA.

3.4.2 Impacts of the Proposed Action

Direct and Indirect Impacts

Two parameters are considered when evaluating habitat loss—direct habitat loss and effective habitat loss. Direct habitat loss occurs through the removal of vegetation, which reduces the extent or quality of habitat in terms of food and cover. Vegetation removal strips the affected area of its value to wildlife; therefore, direct habitat loss can be quantified by comparing the area of habitat lost to the amount retained. The amount of habitat available to wildlife is called effective habitat. The effectiveness of habitat is lost when a species reduces use of or avoids an area. Loss of effective habitat area can exceed direct habitat loss. Effective habitat loss can occur from habitat fragmentation, disturbance, and interference with wildlife movement. Impacts from habitat fragmentation are related to the loss of large contiguous areas of habitat and the relative increase in habitat “edge” in smaller areas. Construction of roads and other development, as well as human and vehicular traffic on existing roads, can cause habitat fragmentation. Such disturbance can cause animals to shift their activities to other locations or otherwise alter their behavior.

The proposed action would result in the removal and modification of approximately 54.91 acres of vegetation including an estimated 1,880 to 1,950 piñon and juniper trees. Included in the 54.91 acres affected are 5.4 acres in habitat improvement areas within the Crow Mesa SDA. Vegetation communities within the analysis area provide forage and cover for big game and other wildlife species. Since the vegetation removed would not be replaced with the same species and because vegetation removal in previously undisturbed areas would result in habitat fragmentation, an alteration of available wildlife habitat and utilization is anticipated.

Impacts to wildlife habitat would include short-term loss of natural vegetation and long-term changes in vegetation composition. Most wildlife species observed or expected to inhabit the area are generalists and would be minimally affected by the changes in vegetation composition. The majority of direct habitat loss would be short term, as areas reclaimed would eventually recover their value as wildlife habitat. However, there would be a long-term loss of approximately 7.1 acres for well operation and access. Additionally, wooded areas would take decades to reestablish trees. The loss of approximately 1,880 to

1,950 trees would result in a long-term reduction in big game cover. However, removal of trees along proposed pipeline corridors would likely result in an increase in herbaceous and browse species following reclamation.

Encana would conduct a field study to evaluate antelope bitterbrush reestablishment by comparing direct seeding and transplanting methods. Additionally, offsite mitigation would be conducted on 5 acres of land to offset impacts to antelope bitterbrush that has reestablished in the existing pipeline corridor. These design features would serve to minimize impacts to big game and would also acquire data for studying future reclamation or habitat improvement techniques.

Under the proposed action, several seasonal ponds in the area would be cleaned out and silt ponds would be constructed to control drainage around the well pads. Encana would provide a guzzler to be placed in the SDA at the BLM's discretion. In arid regions, guzzlers are storage tanks that collect rainwater to provide wildlife water sources. These water sources are important for sustaining big game and other wildlife populations in the area. Having multiple water sources also serves to distribute wildlife across the different habitat types in the SDA as wildlife and livestock can concentrate use around water sources.

Mule deer and elk have been shown to avoid natural gas wells, roads, and areas immediately surrounding them, resulting in a loss of effective habitat. Hebblewhite (2011) summarized that the average zone of influence reported in eight different studies extended about 1,000 meters (3,281 feet) from roads and wells. The nature and extent of this avoidance is dependent upon the type of vegetation, particularly the amount of cover present, topography, traffic volume, and whether or not vehicles stop or continue moving; however, responses varied within seasons and among species. Disturbance is a primary factor in effective habitat loss as it can alter the ways wildlife use or move through an area and could push individual animals from preferred habitat into less suitable habitat. Such displacement would likely be localized around the source of the disturbance (e.g., equipment noise, human presence). Data collected by the BLM and New Mexico Department of Game and Fish in the Rosa Wildlife SDA between 1994 and 2012 indicate a positive correlation between the increasing number of gas wells and accompanying roads, and the decline in mule deer fawn-to-doe ratios.

Since there is so much variability between studies, and no studies specific to the BLM/FFO have been completed, a conservative buffer of 400 meters (1,312 feet) was selected to quantify the potential effective habitat loss resulting from the proposed action. Based on a 400-meter buffer of the proposed action (well pads and new roads), indirect wildlife habitat loss would affect approximately 685 acres. Avoidance by wildlife would depend on the species, time of day, time of year, human activity level, topography, and cover type. It should also be noted that the zone of influence around roads and well pads does not imply 100 percent avoidance (Hebblewhite 2011). Impacts from effective habitat loss would be greatest during construction and drilling and would decrease over time in correlation to human and vehicular activity levels.

During construction, drilling, and completion, there would be short-term impacts to area wildlife because of human and vehicular activity and associated noise. Wildlife in the area would be displaced to adjacent habitat or may temporarily avoid the area during construction activities. Small wildlife, particularly burrowing species, may be killed during construction, drilling, and completion. Vehicles accessing the proposed well pads would include light-duty trucks such as pick-ups and welding rigs and heavy-duty vehicles such as water trucks, 2-ton bobtails, and semi-trucks. It is unlikely that the three well locations

would be developed simultaneously, given that the applicant is only employing one drilling rig in the Crow Mesa area.

Depending on each stage of the proposed action (i.e., construction, drilling, completion), traffic levels could vary widely. Typically, traffic levels would have a low and high range given the variability of each well pad location and the wells drilled. The highest increase in daily traffic levels would occur during the completion stage during which trucks hauling in sand, water, and other materials would be accessing the site. Table 3-10 lists the activity, type of vehicle, and number of daily round trips that are estimated to occur per well under the proposed action. Traffic estimates are based on a conservative timeframe for each stage and the high end of the range. The traffic estimates in Table 3-10 are based on construction of one well pad/access road/pipeline and drilling and completion of one well. Regardless of how many wells are drilled from the pad, traffic estimates for road and pipeline construction, and reclamation would not increase.

Table 3-10. Estimated traffic levels resulting from the proposed action

Activity	Length (days)	Total Number Round Trips	Average Daily Round Trips
Construction	18	40	2
Drilling	12	354	30
Completion	10	1240	124
Flow testing	20	489	24
Well-tie pipeline construction	21	180	9
Reclamation	30	257	9

Once the project is complete, wildlife would likely return to the area. During operation, the level of human and vehicular activity in the analysis area would decrease substantially. However, one light-duty vehicle would continue to access the area on a near daily basis. Heavy-duty vehicles (semi-trucks) would access the well sites one or two times a day for approximately 6 months after which traffic trips would decrease to approximately one trip per month. Average daily truck trips per well for operations over a 3-year period are shown in Table 3-11. The proposed three-phase gathering system for the Escrito D14-2407 would minimize the number of operational truck trips into the Crow Mesa SDA. The gathering system would be designed to transport liquids to a central facility located at the existing Escrito E13-2407 outside the SDA.

Table 3-11. Average daily truck trips per well for 3-year period

Timeframe	Truck Trips	Average Daily Trips
Month 1	73	2
Month 2	63	2
Month 3	48	2
Month 4	39	1
Month 5	34	1
Month 6	30	1
Month 7-12	28	1 per month
Year 2	19	1.5 per month
Year 3	12	1 per month

During drilling and completion, the Escrito E07-2407 location would be accessed from the south and east. For production, the location would be access from the south and west. By accessing the location from the west during production, traffic would skirt along the edge of the Crow Mesa SDA rather than travel through the interior (Figure 5). This would minimize disturbance to big game and other wildlife particularly during the winter months.

Long-term impacts from vehicle traffic on roads could include incidental mortality to wildlife. Animal-vehicle collisions are variable depending on the time of day, speed and volume of traffic, local topography, structural features of the road, and the size and behavior of individual species. The proposed access roads also would facilitate entry to areas not previously open to vehicular travel, potentially resulting in increases in legal and illegal hunting. The proposed action would increase the existing road network by approximately 0.21 mile (1,116 feet).

Wildlife could come into contact with chemicals or fluids stored on-site. Use of a closed-loop system would minimize potential impacts to wildlife from exposure to chemicals or fluids during drilling and completion. During operation, any open pits would be netted and vent caps placed on all open pipes to prevent birds from entering and nesting. Any spills would be cleaned up promptly; Encana maintains an emergency response plan. All chemicals or fluids stored on-site would be properly contained and would have secondary containment.

Cumulative Impacts

Reasonably foreseeable development within the Blanco sub-watershed may include an estimated additional 677 oil and gas wells and related facilities, and 55 miles of new roads. Figure 6 in Appendix A shows the sub-watersheds and the proposed well locations. Surface-disturbing activities associated with these actions may affect an estimated 2,514 acres. Reasonably foreseeable development within the Largo sub-watershed may include an estimated additional 810 oil and gas wells and related facilities as well as 147 miles of new roads. Surface-disturbing activities associated with these actions may affect an estimated 6,756 acres (USDI/BLM 2003a, page 4-7 and 4-8). Other reasonably foreseeable actions such as continued livestock grazing, vegetation treatments, and community development would cumulatively

impact wildlife through direct and effective habitat loss. The proposed action would cumulatively contribute approximately 7.1 acres of direct habitat loss and up to approximately 685 acres of indirect big game effective habitat loss in the planning area. The proposed action would contribute 0.21 mile of new road to the existing road network in the planning area.

3.5 Special Management Species

3.5.1 Affected Environment

In accordance with BLM Manual 6840, the BLM manages certain sensitive species not federally listed as threatened or endangered in order to prevent or reduce the need to list the species as threatened or endangered in the future. There also are state-listed threatened or endangered species potentially occurring in San Juan County, New Mexico. Table 3-12 lists the special management species that have the potential to occur in the analysis area. A Biological Survey Report for each proposed well pad project was prepared and is provided in Appendix D. The Biological Survey Reports provide the basis for the findings listed in Table 3-12.

Table 3-12. Species with special management status with potential to occur in the analysis area

Species	Conservation Status	Habitat Associations
Mammals		
Spotted bat (*Euderma maculatum*)	BLM Sensitive State Threatened	Meadows in subalpine coniferous forests are the preferred habitats for this species; rocky cliffs are important for roosting. Also recorded in a wide variety of habitats, from riparian and piñon-juniper woodlands to ponderosa pine.
Townsend's big-eared bat (*Corynorhinus townsendii*)	BLM Sensitive	Roosts mostly in caves or mines; can roost in abandoned buildings at night. In summer, this species occurs widely across the state and can be found over desert scrub, desert-mountains, oak-woodland, piñon-juniper, and coniferous forests.
Birds		
American peregrine falcon (*Falco peregrinus anatum*)	BLM Sensitive State Threatened	Located in rugged terrain with rocky cliffs and canyons (30 to over 1,000 feet high), typically adjacent to rivers, lakes, or streams. Urban areas with towers and buildings also inhabited.
Bendire's thrasher (*Toxostoma bendirei*)	BLM Sensitive	Typically inhabits sparse desert shrubland and open woodland with scattered shrubs or trees.
Chestnut-collared longspur (*Calcarius ornatus*)	BLM Sensitive	A native prairie specialist that winters in grasslands, deserts, and plateaus dominated by low grasses and forbs, where most vegetation is less than 1.5 feet high.
Ferruginous hawk (*Buteo regalis*)	BLM Sensitive	Flat or rolling terrain in grasslands, shrub-steppes, deserts, and badlands; prefers elevated nest sites (e.g., buttes, utility poles, trees, and ledges).

Species	Conservation Status	Habitat Associations
Golden eagle (*Aquila chrysaetos*)	BLM Sensitive	In the western U.S., mostly open habitats in mountainous, canyon terrain. Nests primarily on cliffs and in trees.
Gray vireo *(Vireo vicinior)*	State Threatened	Mixed piñon-juniper, juniper sagebrush associations, and dry brushland with oak scrub woodlands.
Piñon jay *(Gymnorhinus cyanocephalus)*	BLM Sensitive	Primarily associated with piñon-juniper habitat.
Prairie falcon (*Falco mexicanus*)	BLM Sensitive	Arid, open regions of grassland or scrub vegetation with cliff formations that are at least 30 feet high. Breeding cliffs sometimes are in semi-open regions with scattered conifer trees and occasionally dense woodlands.
Plants		
Aztec gilia (*Aliciella formosa*)	BLM sensitive State Endangered	Salt desert scrub communities in soils of the Nacimiento Formation (5,000 to 6,000 feet).
Brack's hardwall cactus (*Sclerocactus cloveriae* ssp. *brackii*)	BLM sensitive State Endangered	Sandy clay of the Nacimiento Formation in sparse shadscale scrub (5,000 to 6,000 feet).

Sources: BISON-M 2014; NHNM 2014; USDI/BLM 2008c, 2012

One Brack's hardwall cactus (*Sclerocactus cloveriae* ssp. *brackii*) and a piñon jay (*Gymnorhinus cyanocephalus*) were observed during surveys at the Escrito L14-2408. A juvenile golden eagle (*Aquila chrysaetos*) was observed during the Escrito D14-2407 biological surveys.

3.5.2 Impacts from the Proposed Action

Direct and Indirect Impacts

The analysis area provides potential foraging habitat for the spotted bat (*Euderma maculatum*) and Townsend's big-eared bat (*Corynorhinus townsendii*). No suitable roosting habitat would be modified by the proposed action. The proposed D14-2407 pipeline would leg-off the side of Blue Mesa where marginal suitable habitat is located; therefore, no ground disturbance would occur. Impacts may include avoidance of the analysis area by these species during nighttime drilling due to disturbance and activity from human and vehicle presence and associated noise. Impacts from avoidance would be short term for the duration of drilling and limited to warmer months when these species might be in the area.

The Escrito D14-2407 and Escrito L14-2408 project footprints provide suitable habitat for Bendire's thrasher (*Toxostoma bendirei*) and suitable wintering habitat for chestnut-collared longspur (*Calcarius ornatus*). The proposed action would result in the modification of approximately 41.6 acres of Bendire's thrasher habitat and 36.2 acres of potential wintering habitat for chestnut-collared longspur. Up to approximately 1,950 piñon and juniper trees of varying size would be removed. Conversion of woodlands

to grass- and shrublands in the short term may benefit these species. In the long term, 7.1 acres would be converted to industrial use.

Piñon jay and gray vireo (*Vireo vicinior*) may utilize the piñon-juniper woodlands found throughout the analysis area for foraging. The proposed Escrito D14-2407 and Escrito E07-2407 project footprints may also provide nesting habitat. The proposed action would remove approximately 18.7 acres of potential nesting and foraging habitat, including up to approximately 1,950 piñon and juniper trees. These impacts would be long term. There would also be a long-term reduction in food source for these species. Short-term impacts may result from increased noise and activity during construction and drilling, which may cause these species to avoid the area.

The analysis area contains open desert scrub, providing potential foraging habitat for the golden eagle, American peregrine falcon (*Falco peregrinus anatum*), and prairie falcon (*Falco mexicanus*). The Escrito L14-2408 project footprint provides potential foraging habitat for ferruginous hawk (*Buteo regalis*). No potential nesting habitat for these species would be removed or modified by the proposed action. It is possible that these raptor species could forage in the vicinity or fly through the analysis area. Direct impacts would include the modification of approximately 54.9 acres of foraging habitat for golden eagle, American peregrine falcon, and prairie falcon. Less than 20 acres of suitable foraging habitat for ferruginous hawk would be impacted by the proposed action. Approximately 1,950 piñon and juniper trees of various ages and sizes would be removed by the proposed action, resulting in a long-term loss of potential perch sites. This loss of perch habitat is not expected to adversely affect the foraging abilities of these raptor species, given the abundance of suitable sites in the surrounding area and the large size of their home ranges. After reclamation, there would be a short- to long-term change in vegetation density and composition that could affect the prey base for these raptors. Long-term impacts would occur in wooded areas, as it could take several decades for trees to reestablish. Impacts from the loss of 7.1 acres of suitable foraging habitat would be long term. Additional impacts may include avoidance of the analysis area by these raptor species during construction, drilling, and operation due to disturbance and activity from human and vehicle presence and associated noise.

Approximately 0.3 acre of badland habitat occurs in the Escrito L14-2408 project footprint and provides potential habitat for the Aztec gilia (*Aliciella formosa*). No Aztec gilia were found in the area during the biological surveys. However, there would be a long-term loss of approximately 0.3 acre of potential but unoccupied habitat following reclamation.

Based on soil characteristics, the Escrito L14-2408 project footprint contains approximately 1.5 acres of suitable habitat for Brack's hardwall cactus. One Brack's hardwall cactus was observed within the construction zone of the proposed well pad. Under the proposed action, approximately 1.5 acres of suitable but unoccupied habitat would be lost for the long term.

Cumulative Impacts

The BLM/FFO would continue to manage non-federally listed species according to BLM policies and guidelines, with the goal of contributing to the conservation of these species to reduce the potential for being listed under the Endangered Species Act (ESA) of 1973, as amended (USDI/BLM 2003a, 4-111). For reasonably foreseeable actions on federal lands, direct impacts to nesting special status raptor species would be avoided through the BLM's siting criteria. Development on federal and private lands would

result in the removal or modification of potential foraging habitat. These effects would be related to availability of undisturbed habitat and the amount of disturbance that would occur within the analysis area.

The PRMP/FEIS determined that up to 5.5 percent (128,000 acres) of vegetation in the planning area could be impacted cumulatively by oil and gas development (USDI/BLM 2003a, page 4-125). Other reasonably foreseeable actions within the planning area that could impact special status species would include livestock grazing, agriculture, commercial and residential development, mining, and vegetation management. The proposed action would not contribute appreciably to a cumulative habitat loss for BLM special management species within the planning area.

3.6 Migratory Birds

3.6.1 Affected Environment

Under the Migratory Bird Treaty Act and Executive Order 13186, federal agencies are required to consider impacts to migratory birds from management activities. The BLM migratory bird conservation policy for the planning area is detailed in Instruction Memorandum No. NM-F00-2010-001 (USDI/BLM 2010). This management policy establishes a consistent approach for addressing migratory bird populations and habitats when by making project-level implementation decisions. The management policy also outlines best management practices and design features to avoid or minimize impacts.

While all migratory songbirds are protected by law, certain species have been determined to be at greater risk than others. More than 350 avian species occur in San Juan County and the surrounding area administered by the BLM/FFO, which includes portions of Sandoval County. Data collected through breeding bird surveys coordinated by the USFWS and private sector efforts provided the basis for the New Mexico Partners in Flight (NMPIF) organization to develop bird “watch lists” and the USFWS list of Birds of Conservation Concern. The NMPIF also identified priority species of birds by habitat type for the state of New Mexico. The BLM/FFO area lies within the Colorado Plateau physiographic region, as identified by the NMPIF. The analysis area contains of the habitat types, the Great Basin desert shrub (sage-grass) and piñon-juniper woodland.

The Bird Conservation Plan developed for the state of New Mexico by the NMPIF lists the sage thrasher (*Oreoscoptes montanus*) and sage sparrow (*Amphispiza belli*) as a “highest priority” species for conservation in the Great Basin desert shrub habitat. Priority species in piñon-juniper woodland habitat include the gray vireo, piñon jay, and juniper titmouse *(Baeolophus ridgwayi)*. Most of the priority bird species identified by the NMPIF also occur on the USFWS Division of Migratory Bird Management list of “Birds of Conservation Concern 2008” within the Bird Conservation Region 16-Southern Rockies/Colorado Plateau. Birds included on this list are those “species, subspecies, and populations of all migratory non-game birds that, without additional conservation actions, are likely to become candidates for listing under the ESA of 1973” (USFWS 2008).

A variety of bird species may be found in the analysis area such as Bendire’s thrasher, loggerhead shrike (*Lanius ludovicianus*), and vesper sparrow (*Pooecetes gramineus*).

3.6.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Executive Order 13186 calls for increased efforts to fully implement the Migratory Bird Treaty Act. In keeping with this mandate, the BLM consulted the NMPIF Bird Conservation Plan for the state of New Mexico and the USFWS list of Birds of Conservation Concern. A review of these documents, specifically as they pertain to the Colorado Plateau physiographic area, indicates there are three "priority" avian species with a known range of distribution in the BLM/FFO planning areas that utilize the piñon-juniper woodland habitat and eight priority species that utilize the sage-grass habitat within the Great Basin desert shrub habitat.

Various types of perturbations and/or anthropogenic activity may affect these species. These species and a brief assessment of the effects of the proposed action on their habitat are provided in Table 3-13.

Table 3-13. Migratory bird species of concern potentially occurring within the analysis area and effects from the proposed action

Species	Habitat Type	Effects
Grasshopper sparrow (*Ammodramus savannarum*)	Sage-grass	May be positively affected due conversion to grassland
Sage sparrow[1] (*Amphispiza belli*)	Sage-grass	May be positively affected due conversion to grassland
Burrowing owl (*Athene cunicularia*)	Sage-grass	No effect; nests in abandoned prairie dog burrows
Ferruginous hawk (*Buteo regalis*)	Sage-grass/piñon-juniper interface	Short- and long-term loss of foraging habitat
Mountain plover (*Charadrius montanus*)	Sage-grass	No effect; no suitable habitat in the analysis area
Long-billed curlew (*Numenius americanus*)	Sage-grass	May be positively affected due to conversion to grassland
Sage thrasher[1] (*Oreoscoptes montanus*)	Sage-grass	May be positively affected due to conversion to grassland
Bendire's thrasher (*Toxostoma bendirei*)	Sage-grass	May be positively affected due to conversion to grassland
Juniper titmouse (*Baeolophus ridgwayi*)	piñon-juniper	Secondary cavity nester; some loss of nesting habitat
Piñon jay (*Gymnorhinus cyanocephalus*)	piñon-juniper	Colony nester in piñon; loss of piñon may impact
Gray vireo (*Vireo vicinior*)	piñon-juniper	Nests in juniper; reduction of juniper may be detrimental

[1] "High Priority" bird species that are on the NMPIF Priority Species List, but not on the USFWS Birds of Conservation Concern 2008 list.

Source: NMPIF 2007

Direct impacts to migratory birds would include the disturbance and modification of approximately 40.6 acres of undisturbed desert scrub and piñon-juniper woodland vegetation. For woodland species, there

would be a long-term loss of approximately 1,880 to 1,950 piñon and juniper trees of varying age and size as well as standing snags. There would be a long-term loss of approximately 7.1 acres of habitat, which would be converted for industrial use. Migratory birds would be impacted by disturbance during construction, drilling, and completion; these impacts would be short term. During production, impacts to migratory birds would be related to an increase in habitat fragmentation and disturbance from periodic traffic for maintenance and fluid removal.

Impacts to migratory birds would be greater should construction occur during the breeding season of May 15 through July 31. Construction, drilling, and completions during this period could result in nest destruction or may cause some nest abandonment in adjacent areas. Pre-construction surveys would be conducted to identify any active nests within the proposed area of disturbance should construction occur between May 15 and July 31.

Migratory birds could come into contact with chemicals or fluids stored on-site. Open pits would be netted and vent caps placed on all open pipes to prevent birds from entering and nesting. Any spills would be cleaned up promptly. Although individual migratory birds could be impacted by the proposed action, no population level impacts are expected.

Cumulative Impacts

Other reasonably foreseeable actions within the planning area that could impact migratory birds include livestock grazing, agriculture, commercial and residential development, mining, wildfire, and vegetation management. Cumulative impacts to migratory birds from the proposed action would result from the long-term changes in density and composition of approximately 40.6 acres of Great Basin desert scrub and piñon-juniper woodland habitat. The proposed action would contribute to cumulative habitat fragmentation within the planning area from construction of approximately 0.21 mile of new road and the loss of 7.1 acres of habitat. The proposed action would contribute negligible impacts to migratory birds when combined with past, present, and future actions.

3.7 Cultural Resources

3.7.1 Affected Environment

The analysis area is located within the archaeologically rich San Juan Basin of northwestern New Mexico. In general, the prehistory of the San Juan Basin can be divided into five major periods: PaleoIndian (ca. 10000 B.C. to 5500 B.C.), Archaic (ca. 5500 B.C. to A.D. 400), Basketmaker II through III and Pueblo I through IV periods (A.D. 1 to 1540), and the historic (A.D. 1540 to present) that includes Native American as well as later Hispanic and Euro-American settlers. A detailed description of these periods and select phases within each period is provided in the Farmington PRMP/FEIS (USDI/BLM 2003a).

Cultural sites vary considerably, and can include but are not limited to simple artifact scatters, domiciles of various types with a myriad of associated features, rock art and inscriptions, ceremonial/religious features, and roads and trails.

Prior to all field surveys of the analysis area, a Class I investigation of records at the BLM/FFO and an online search of Archeological Records Management Services was conducted to determine if any sites have been recorded within 0.25 mile of the survey area.

The entire area of potential effect for the proposed action was archaeologically surveyed by La Plata Archaeological Consultants (LAC) at a BLM Class III level (100 percent). Four reports were prepared and submitted to the BLM in accordance with the *Procedures for Performing Cultural Resources Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities* (USDI/BLM 2005). The cultural resource survey results are summarized as follows:

Escrito E07-2407 (LAC 2013-7s; BLM 2014(III)033F): Four previously recorded sites were identified within ¼ mile of the proposed location. All of these sites were recorded in association with a BLM range management project located in Adams canyon. Five new archaeological sites were discovered and documented within the cultural resources survey area (LA178879, 178880, 178881, 178882, and 178883). Also documented were nine isolated occurrences. Four of the sites are eligible for listing under criterion d and one site requires further data collection. Two of the sites are no longer in proximity to the redesigned project area. The remaining three sites can be avoided by implementing protections during construction.

Escrito D14-2407 (LAC 2012-1bbb; BLM 2014(III)030F): Eight previously recorded sites occur within in ¼ mile of the project, two of these are within 400 feet. During the survey eight newly discovered sites (LA177634, 177635, 177636, 177637, 177638, 177639, 177640, and 17764) were recorded, and one previously recorded site (LA157174) was updated. All of the ~~newly discovered~~ sites are eligible for listing under criterion d or require further data collection. All sites can be avoided by implementing protections during construction.

Escrito L14-2408 (LAC 2012-2f; BLM 2014(III)031F): Sixteen previously recorded sites occur within ¼ mile of the project— eight of these are within 500 feet. During the survey, one newly discovered site (LA1787282) was recorded and is recommended as eligible for listing under criterion d.

3.7.2 Impacts from the Proposed Action

Direct and Indirect Impacts

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

Significant cultural sites (e.g., National Register eligible/listed/undetermined) are being avoided with 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 APDs and ROW grants.

The proposed action is not known to physically threaten any Traditional Cultural Property, prevent access to sacred sites, prevent the possession of sacred objects, or interfere with or otherwise hinder the performance of traditional ceremonies/rituals. The proposed action would have no direct or indirect impact on significant cultural sites.

Cumulative Impacts

The proposed action would have no negative cumulative impact on cultural resources, as significant cultural sites would be avoided. A positive cumulative effect is the additional scientific information yielded by the archaeological surveys.

3.8 Livestock Grazing

3.8.1 Affected Environment

There are 208 grazing allotments managed by the BLM/FFO with approximately 390 grazing authorizations that permit primarily cattle and sheep grazing within in the BLM/FFO boundaries. A very limited number of these allotments also permit some goats, and occasionally horses for ranch use only. Allotments range in size from approximately 20 to over 100,000 acres. For all 208 allotments, the BLM/FFO permits approximately 119,162 active animal unit months (AUMs), of which approximately 9,228 are Navajo Free Use.

Under the Taylor Grazing Act of 1937, allotments can be permitted through Section 3 (permits issued on public lands within grazing districts established by the Act) or Section 15 (grazing leases issued on public lands outside the grazing districts established by the Act). Of the 208 BLM/FFO grazing allotments, 143 are Section 3 allotments and 65 are Section 15 allotments. There are approximately 325 authorizations on Section 3 allotments, of which 3 are very large Navajo community allotments. There are 65 authorizations on the Section 15 allotments. For the Section 15 allotments, 30 are administered by the Bureau of Indian Affairs under a Memorandum of Understanding, 5 are managed under the Navajo Nation Tribal Ranches program, and 30 are located near Lindrith, New Mexico.

There are an additional 21 allotments that are within or overlap the BLM/FFO boundary that are managed by the Rio Puerco Field Office through an interagency agreement. On these 21 allotments, the Rio Puerco Field Office only administers the grazing; the BLM/FFO manages all other uses on these allotments.

The proposed action would be located within the boundaries of the Sheepwell (5084) and the Rancho Largo (5119) grazing allotments. Table 3-12 lists details of these allotments.

Table 3-14. Details of the grazing allotments in the analysis area

Allotment Number	Livestock Number	Livestock Type	Period Begin Date	Period End Date	AUM[1]
5084	4	Horse	03/01	02/28	42
5084	39	Cattle	03/01	02/28	407
5119	300	Cattle	06/01	12/31	1,752

[1]Animal Unit Month

3.8.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Surface disturbance associated with construction of the proposed action would remove approximately 54.9 acres of vegetation, resulting in a short-term reduction in forage and a change to the vegetative species composition. Impacts to grazing resources would occur from the direct short-term loss of about 2.25 animal unit month (AUM) at an estimated 25 acres per AUM. Reclaimed areas would be expected to re-vegetate within 1 to 2 years following reclamation. There would be a long-term loss of approximately 0.3 AUM resulting from the conversion of 7.1 acres to an industrial use for the well pads and access roads. Reseeding of disturbed areas with the approved seed mixes may result in an increase in available forage within the affected allotments. This increase is not expected to be measurable.

Cattle and the occasional horse may occur in or near the analysis area, depending on the time of year. Livestock could become trapped in the open trench and long sections of the open trench could present barriers to livestock movement. There would be a potential for livestock collisions with equipment and vehicles working in the area. However, livestock would be expected to temporarily avoid the area due to increased noise and activity. Gaps would be made as needed in topsoil or subsoil stockpiles to allow for livestock crossing. Pipeline trenches would be inspected for livestock prior to laying pipe and back filling; trenches would not be left open for more than 24 hours.

Livestock could come into contact with chemicals or fluids stored on-site. Use of a closed-loop system would minimize potential impacts to livestock from exposure to chemicals or fluids during drilling and completion. Any spills would be promptly cleaned up and Encana would maintain an emergency response plan. All chemicals or fluids stored on-site would be properly contained and would have secondary containment.

Cumulative Impacts

Other reasonably foreseeable activities within the BLM/FFO planning area that would impact forage resources include off-road vehicle use, vegetation treatments, and grazing. The PRMP determined that total surface disturbance from oil and gas development in the planning area would affect about 1.6 percent of the San Juan Basin. Added to other surface disturbance from urban development, the overall effect of removing rangeland acreage from production would still be minimal when compared to the acreage of available forage (USDI/BLM 2003a, pages 4-126 to 4-127). When added to past, present, and reasonable foreseeable activities within the grazing allotments, the proposed action would not result in measurable changes to the allotments carrying capacity or to available AUMs.

4. SUPPORTING INFORMATION

4.1 Tribes, Individuals, Organizations, or Agencies Consulted

Brenda Linster, Regulatory Lead, Encana

Katie Wegner, Regulatory Analyst, Encana

Holly Hill, Regulatory Analyst, Encana

Jason Eckman, Field Regulatory Analyst, Encana

Steve Merrell, Encana

Matthew Fenton, Encana

Scott Parker, Ecana

Kyle Schneider, NCE Surveying

Jacob Brown, NCE Surveying

Bud Kramme, Walsh engineering

James Cunningham, Scorpion Surveying and Consulting, LLC

Johnny Stinson, Adobe Contractors

4.2 List of Preparers

This EA was prepared by Ecosphere in conformance with the standards of, and under the direction of, the BLM/FFO.

Jim Copeland, Archaeologist, BLM/FFO

John Hansen, Wildlife Biologist, BLM/FFO

John Kendall, Threatened and Endangered Species Biologist, BLM/FFO

Amanda Nisula, Planning and Environmental Specialist, BLM/FFO

Sherri Landon, Paleontologist, BLM/FFO

Steven Willems, Environmental Protection Specialist, BLM/FFO

Sheila Williams, District Botanist, BLM/FFO

Lindsey Eoff, Project Manager, BLM/FFO

Tamara Faust, Realty Specialist, BLM/FFO

Monico Tilden, Realty Specialist, BLM/FFO

Esther Willeto, Tribal Program Director, BLM/FFO

Elizabeth Pruitt Burak, NEPA Specialist, Ecosphere

Joey Herring, Project Manager/Sr. Biologist, Ecosphere

Cindy Lancaster, Sr. Technical Editor, Ecosphere

Carolyn Dunmire, Economist/Planner, Ecosphere

Kylan Frye, Biologist, Ecosphere

Tae Hillyer, Biologist, Ecosphere

Jamie DeMarco, Biologist, Ecosphere

Lucas Phipps, GIS Specialist, Ecosphere

Henry Colomb, GIS Analyst, Ecosphere

Leslie Sesler, LAC

Steven Fuller, LAC

Greg Hovezak, LAC

Fred Harden, LAC

4.3 References

BISON-M. 2014. Biota Information System of New Mexico. Online at http://bison-m.org. Accessed February 2014.

Brugge, D. M. 1993. An Investigation of AIRFA Concerns Relating to the Fruitland Coal Gas Development Area. Office of Contract Archaeology, University of New Mexico. Ms. on file, Bureau of Land Management, Farmington, New Mexico.

Engler, Dr. T. W., Dr. B. S. Brister, Dr. H. Chen, and Dr. L. S. Teufel. 2001. Oil and Gas Resource Development for San Juan Basin, New Mexico. New Mexico Institute of Mining and Technology. Socorro, New Mexico.

Hebblewhite, M. 2011. Effect of Energy Development on Ungulates in Energy Development, editor David E. Naugle. Island Press, Washington, D.C.

Kelly, K., R. Martin, R. Begay, T. Neff, and C. Werito. 2006. "We Will Help You With What We Know": Diné Traditional Cultural Places In Dinétah. Museum of Northern Arizona Environmental Solutions, Inc., Flagstaff. Ms. on file, Bureau of Land Management, Farmington, New Mexico.

Natural Heritage New Mexico (NHNM). 2014 NMBiotics Database. Museum of Southwestern Biology, University of New Mexico, Albuquerque, New Mexico. Available online at: http://nhnm.unm.edu.

New Mexico Department of Agriculture (NMDA). 2009. New Mexico Noxious Weed List Update. Online at http://www.nmda.nmsu.edu/wp-content/uploads/2012/01/weed_memo_list.pdf. Accessed February 2014.

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

New Mexico Partners in Flight (NMPIF). 2007. New Mexico Bird Conservation Plan Version 2.1. C. Rustay and S. Norris, compilers. Albuquerque, New Mexico.

New Mexico Office of the State Engineer (NMOSE). 2013. New Mexico Water Rights Reporting System.

Stone, W. J., F. P. Lyford, P. F. Frenzel, N. H. Mizell, and E. T. Padgett. 1983. Hydrogeology and Water Resources of San Juan Basin, New Mexico. New Mexico Bureau of Mines and Mineral Resources, Hydrologic Report 6.

U.S. Department of the Interior, Bureau of Land Management (USDI/BLM). 2002. Biological Assessment: Impacts to threatened and endangered species related to the resource management plan. U.S. Department of the Interior, Bureau of Land Management, Farmington Field Office, Farmington, New Mexico.

USDI/BLM. 2003a. Farmington proposed resource management plan and final environmental impact statement. U.S. Department of the Interior, Bureau of Land Management, Farmington Field Office, Farmington, New Mexico.

USDI/BLM. 2003b. Farmington resource management plan record of decision. U.S. Department of the Interior, Bureau of Land Management, Farmington Field Office, Farmington, New Mexico.

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

USDI/BLM. 2008a. NEPA Handbook H 1790 1 [BLM 1/30/2008]. Washington, D.C.

USDI/BLM. 2008b. Environmental Assessment of the Criteria and Impacts of Granting Exceptions to the Seasonal Closures Periods in Designated Wildlife Areas. EA Number: NM-210-2008-490. Bureau of Land Management Farmington Field Office. Farmington, New Mexico.

USDI/BLM. 2008c. Special status species management. Instruction Memorandum No. NM-200-2008-001. Bureau of Land Management, Farmington Field Office, Farmington, New Mexico.

USDI/BLM. 2010. Instruction Memorandum No. NM-F00-2010-001. Migratory Bird Treaty Act-BLM/FFO Interim Management Policy. Bureau of Land Management, Farmington Field Office, Farmington, New Mexico.

USDI/BLM. 2012. Farmington Field Office Final Sensitive Species List. Bureau of Land Management, Farmington Field Office. Farmington, New Mexico.

USDI/BLM. 2013. Air Resources Technical Report for Oil and Gas Development. New Mexico, Oklahoma, Texas, and Kansas. Bureau of Land Management, New Mexico State office. Santa Fe, New Mexico.

USDI/USDA. 2007. Surface and Operating Standards and Guidelines for Oil and Gas Exploration and Development. BLM/WO/ST-06/021+0371/REV 07. Denver, Colorado.

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

USEPA. 2008. National Emissions Inventory. Available online at: http://www.epa.gov/ttn/chief/net/2008inventory.html.

USEPA. 2011. 2005 National-scale Air Toxics Assessment. Summary of Results. Available online at: http://www.epa.gov/ttn/atw/nata/.

USEPA. 2012. Air Trends: Design Values. Available online at: http://www.epa.gov/airtrends/values.html.

U.S. Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. Available online at: http://www.fws.gov/migratorybirds/.

Van Valkenburgh, R. F. 1941. Diné Bikeyah. Department of the Interior, Office of Indian Affairs, Navajo Services, Window Rock. Ms. On file, Bureau of Land Management, Farmington, New Mexico.

Van Valkenburgh, R. F. 1974. Navajo Sacred Places and Short History of the Navajo People. Garland American Indian Ethnohistory Series, Navajo Indians, 3 vols. Garland Publishing, Inc., New York and London.

Appendix A – Maps and Photographs

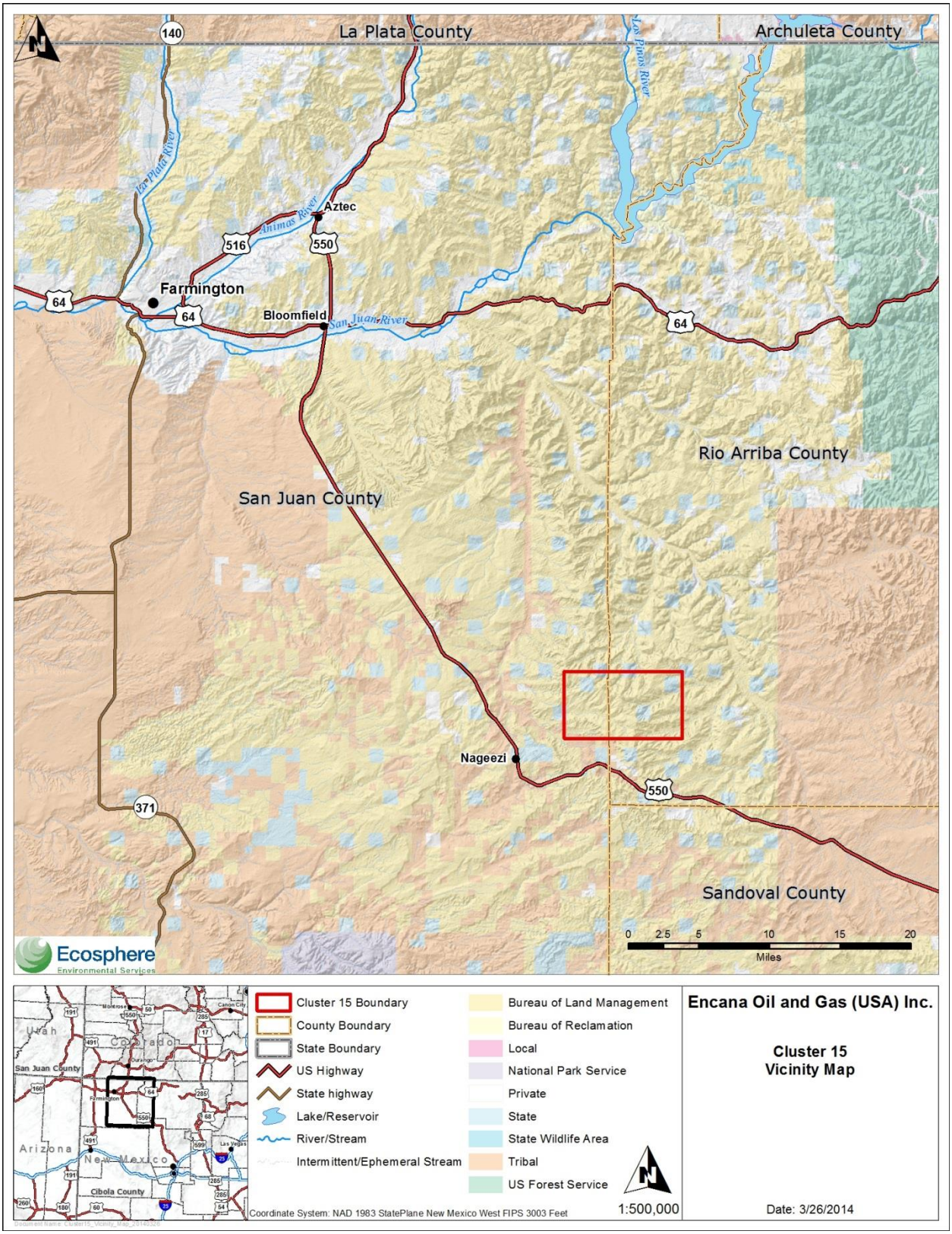


Figure 1. Proposed Escrito Cluster 15 Vicinity Map

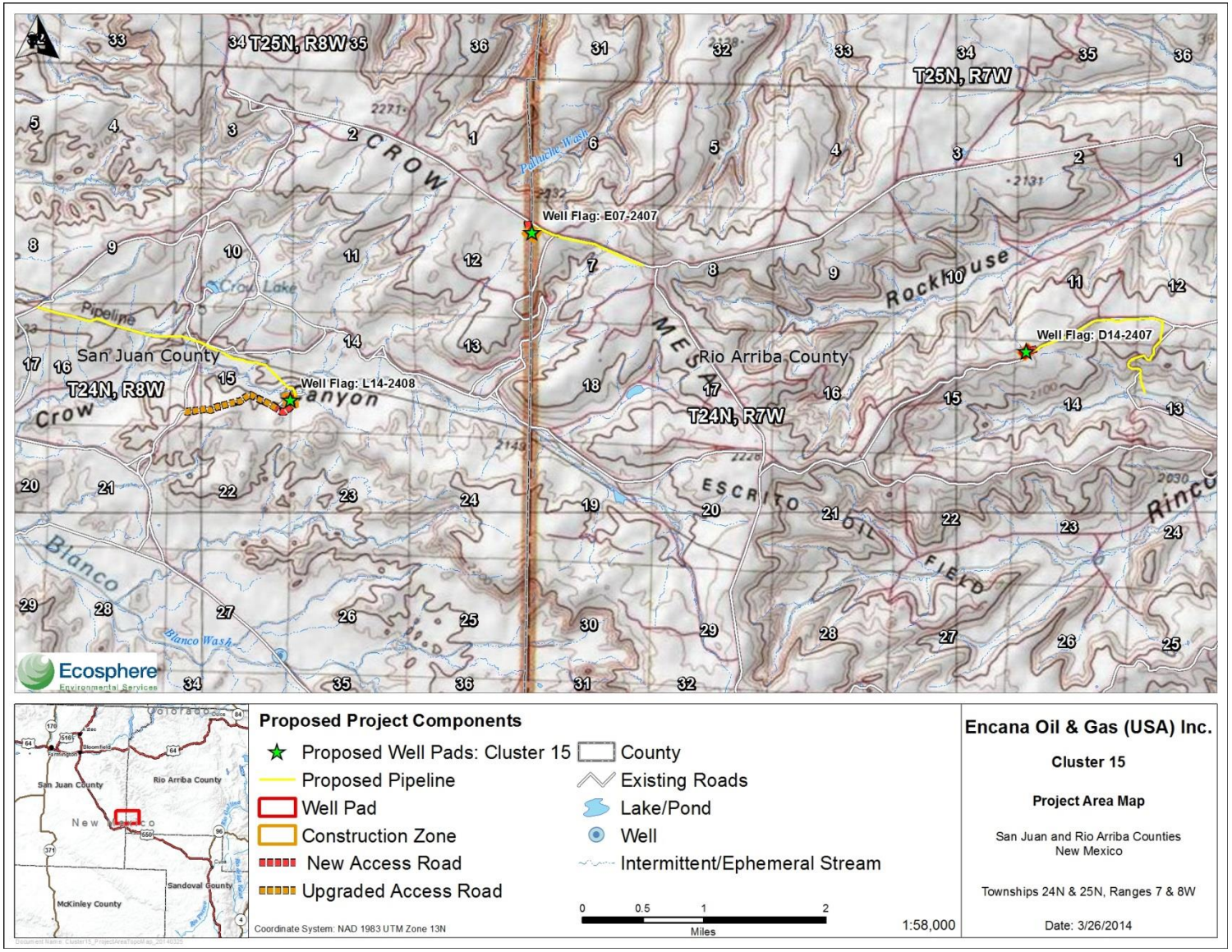


Figure 2: Proposed Escrito Cluster 15 Analysis Area

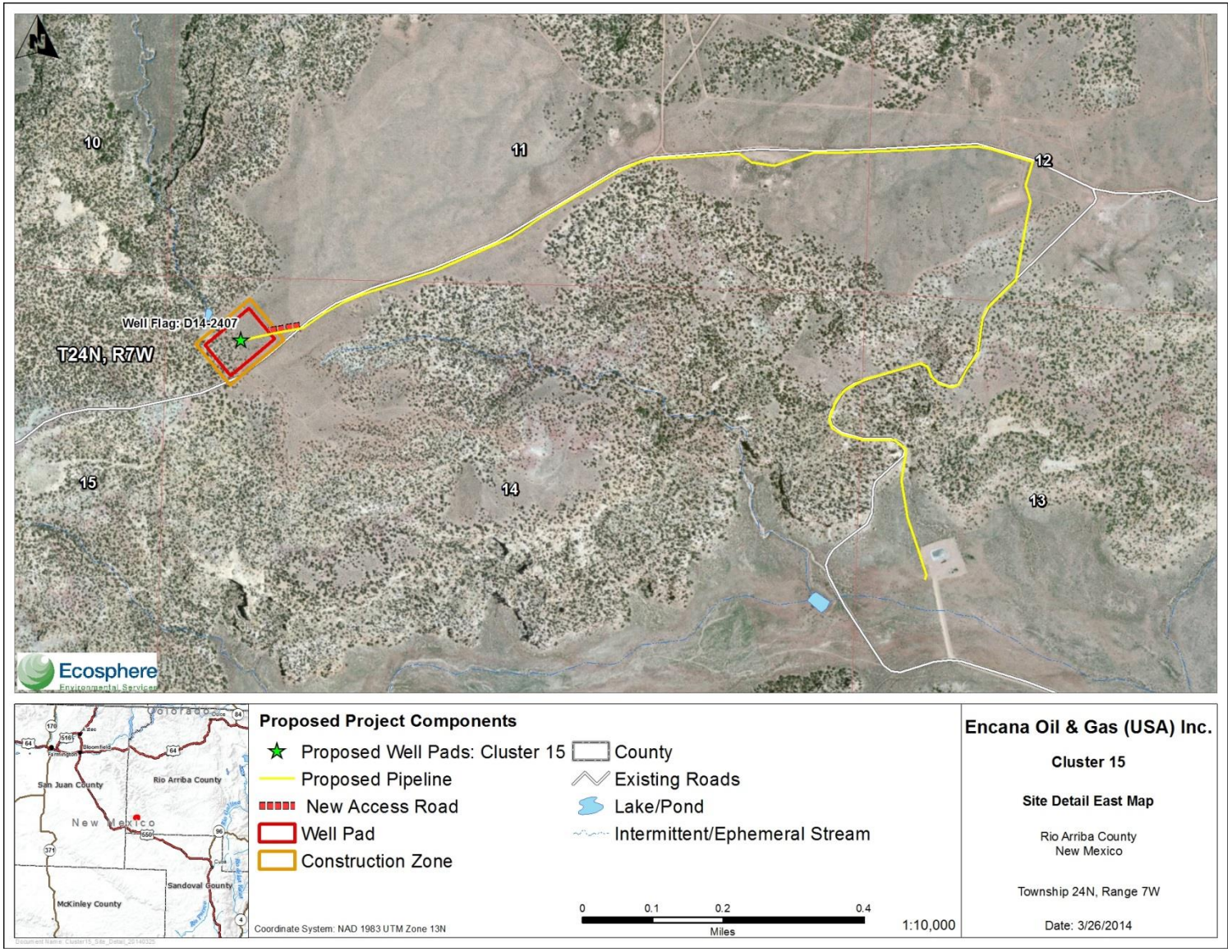


Figure 3: Proposed Escrito Cluster 15 Site Detail East

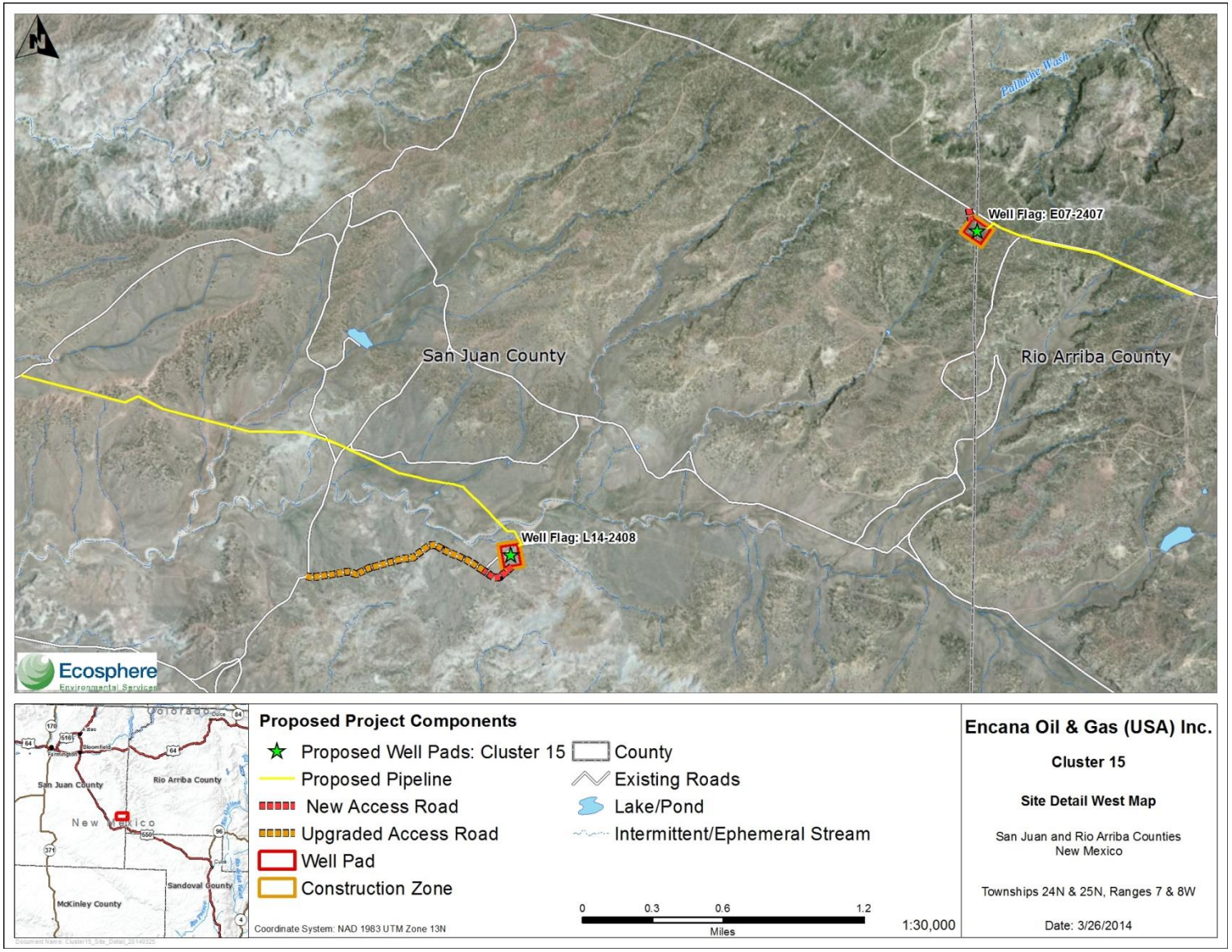


Figure 4. Proposed Escrito Cluster 15 Site Detail West

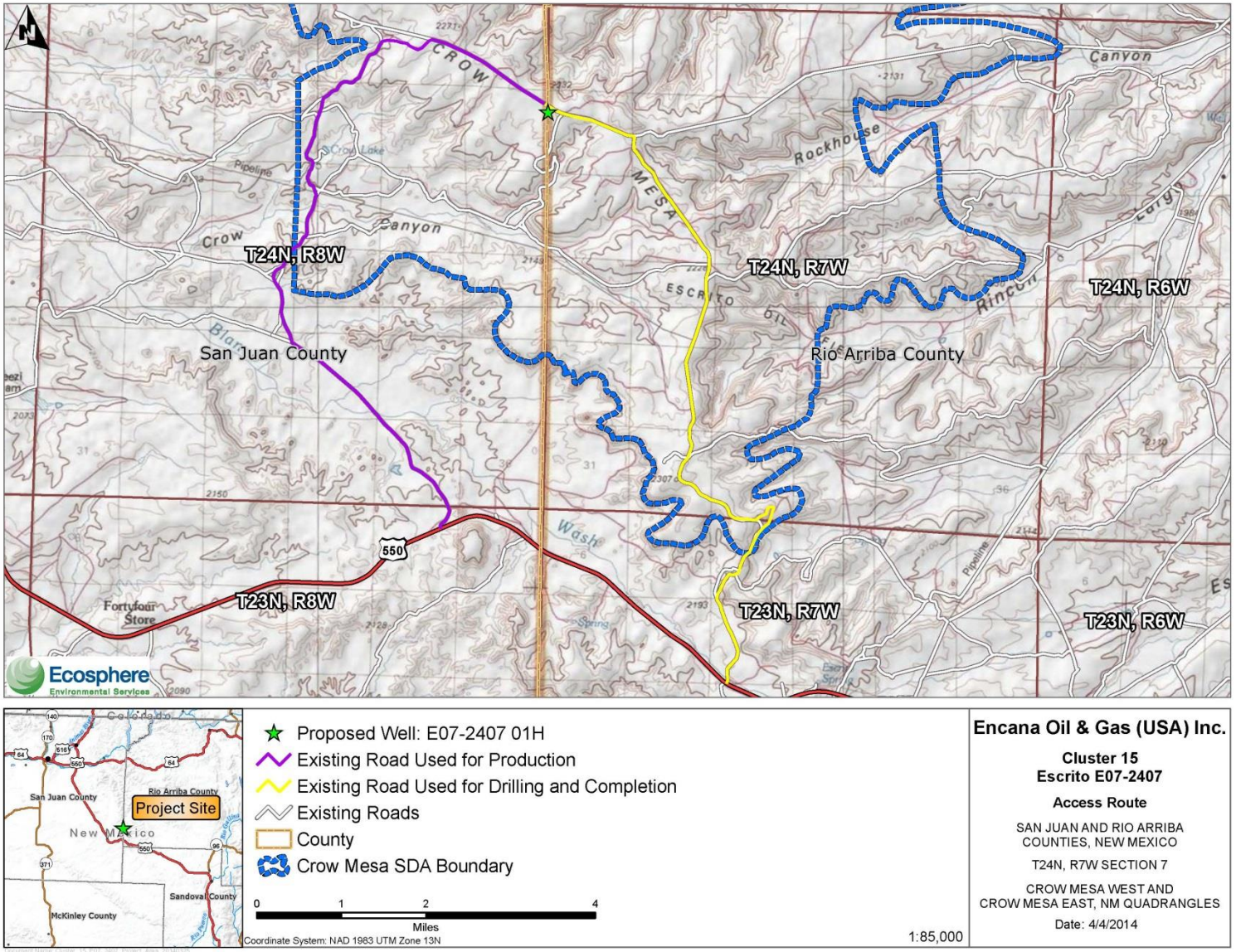


Figure 5. Escrito E07-2407 development and operation access routes

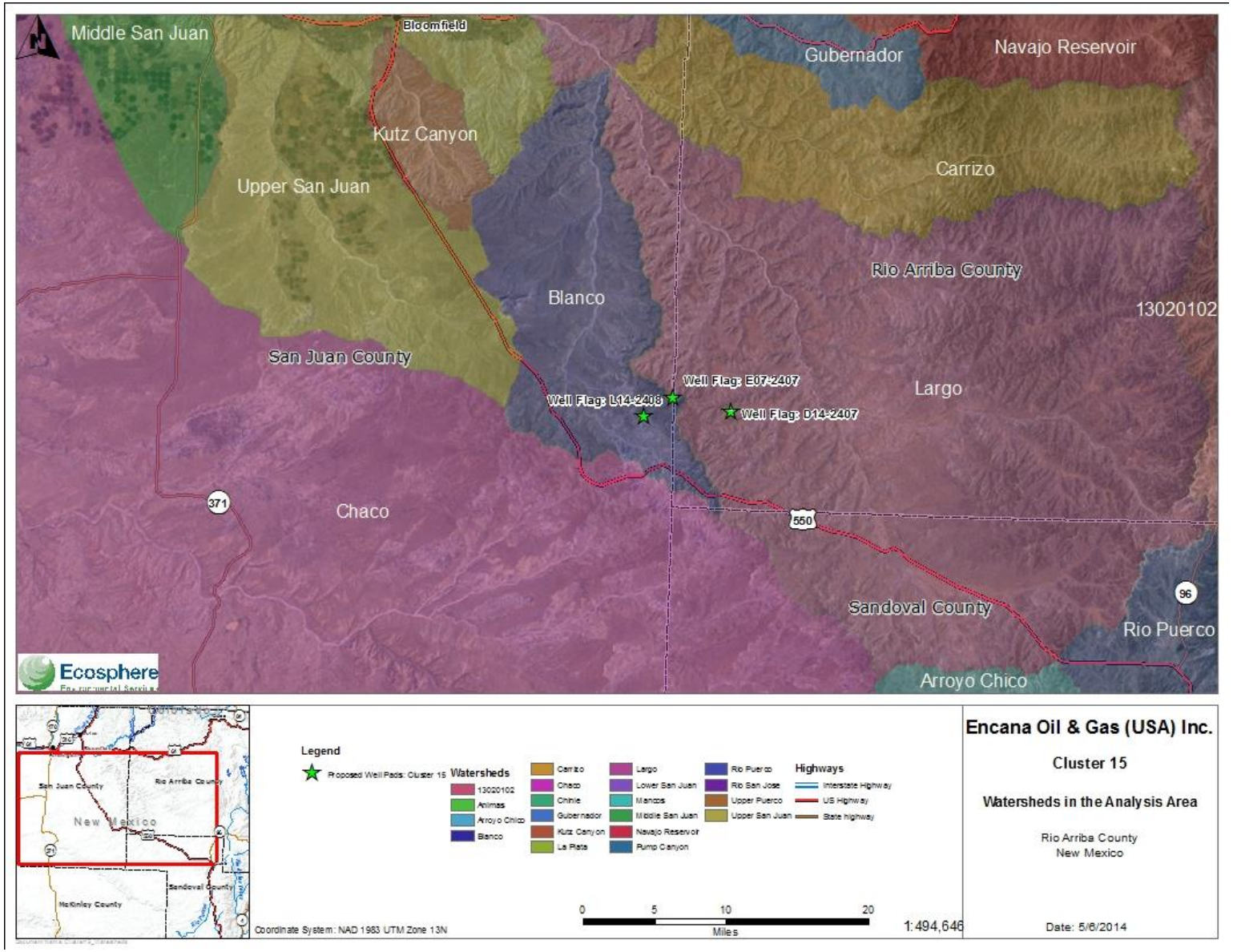
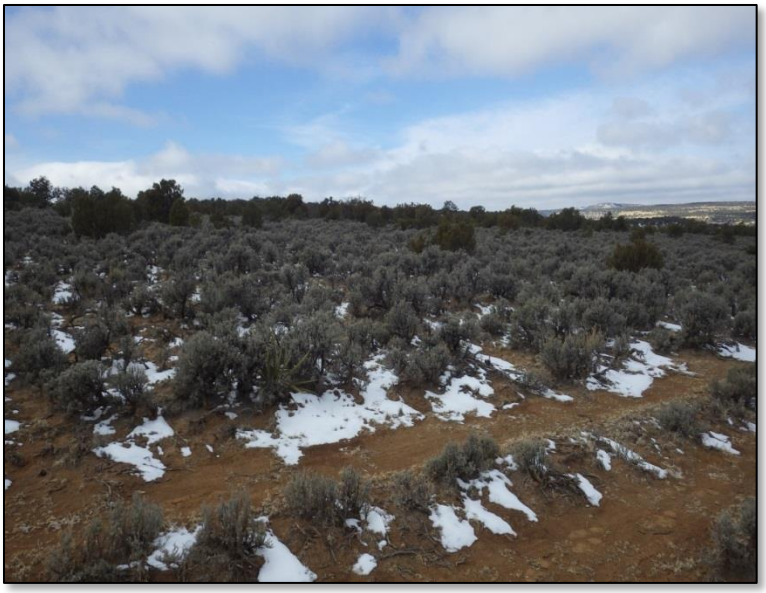


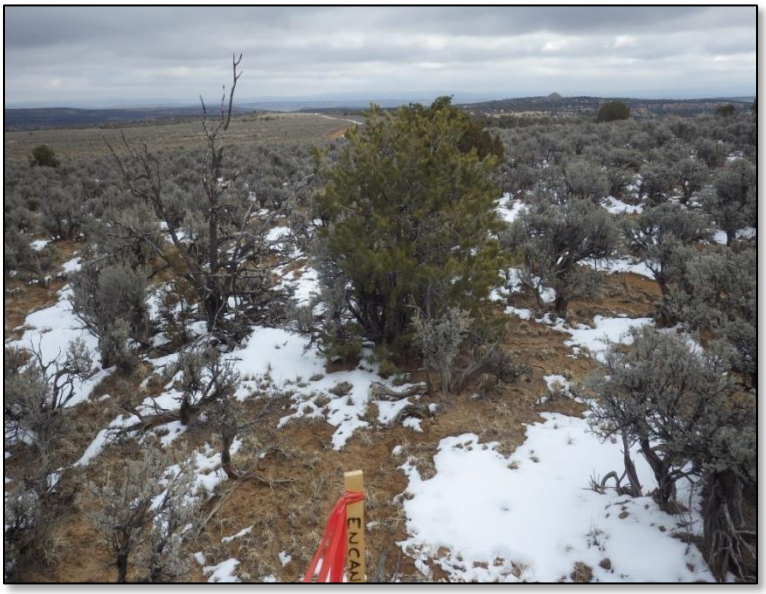
Figure 6. Watersheds in the Cluster 15 analysis area

Photograph 1: Escrito E07-2407 looking northwest from the access road and pipeline corridor

Photograph 2: Escrito E07-2407 looking south from well pad corner 2

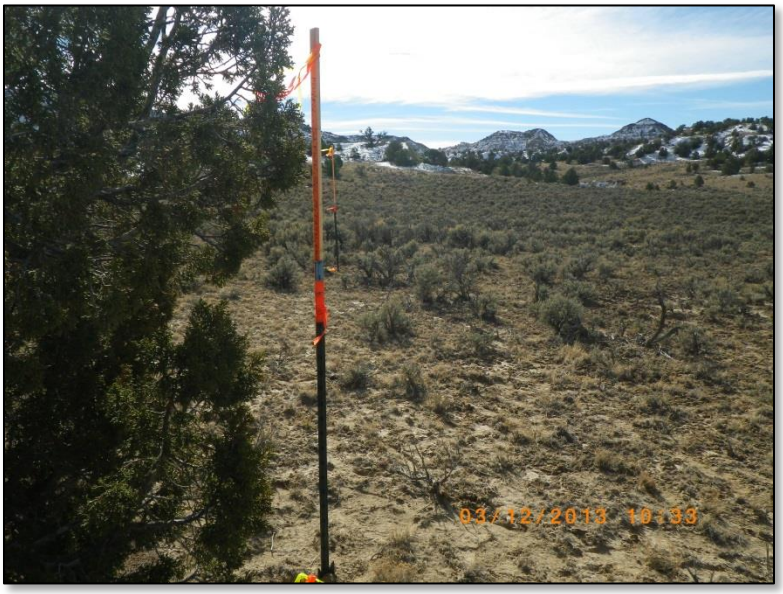


Photograph 3: Escrito D14-2407 looking southwest from well pad corner 2



Photograph 4: Escrito D14-2407 looking northeast from the end of the access road and pipeline corridor

Photograph 5: Escrito L14-2408 looking northeast from well pad corner 5



Photograph 6: Escrito L14-2408 looking south from the well pad center stake

Appendix B – Applications for Permit to Drill and Right-of-Way Grant Applications

Appendix C – Conditions of Approval and Stipulations

Appendix D – Biological Survey Reports