

**United States Department of the Interior
Bureau of Land Management
San Luis Valley Field Office
46525 Highway 114
Saguache, CO 81149**

Environmental Assessment

DOI-BLM-CO-300-2012-012-EA

DAHC San Francisco #1 Well

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Table of Contents

List of Tables	3
List of Figures	3
CHAPTER 1 - INTRODUCTION.....	4
1.1 IDENTIFYING INFORMATION	4
1.2 INTRODUCTION AND BACKGROUND	4
1.3 PURPOSE AND NEED	5
1.4 DECISION TO BE MADE	5
1.5 PLAN CONFORMANCE REVIEW	6
1.6 SCOPING, PUBLIC INVOLVEMENT AND ISSUES	7
CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES.....	9
2.1 INTRODUCTION	9
2.2 ALTERNATIVES ANALYZED IN DETAIL	9
2.2.1 PROPOSED ACTION	9
2.2.2 NO ACTION ALTERNATIVE	11
2.2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS	12
CHAPTER 3 - AFFECTED ENVIRONMENT AND EFFECTS	13
3.1 INTRODUCTION	13
3.1.1 INTERDISCIPLINARY TEAM REVIEW.....	13
3.2 PHYSICAL RESOURCES	15
3.2.1 AIR QUALITY AND CLIMATE.....	15
3.2.2 GEOLOGIC AND MINERAL RESOURCES	27
3.2.3 SOILS.....	32
3.2.4 WATER (SURFACE AND GROUNDWATER, FLOODPLAINS)	36
3.3 BIOLOGICAL RESOURCES	44
3.3.1 VEGETATION	44
3.3.2 INVASIVE PLANTS	50
3.3.2 THREATENED, ENDANGERED AND SENSITIVE SPECIES	51
3.3.3 WILDLIFE AQUATIC.....	62
3.3.4 WILDLIFE TERRESTRIAL.....	67
3.3.5 MIGRATORY BIRDS	77
3.4 HERITAGE RESOURCES AND HUMAN ENVIRONMENT	85
3.4.1 CULTURAL RESOURCES.....	85
3.4.2 NATIVE AMERICAN RELIGIOUS CONCERNS.....	87
3.4.3 VISUAL RESOURCES	87
3.4.4 SOCIOECONOMIC	93
3.4.5 ENVIRONMENTAL JUSTICE	95
3.4.6 WASTES, HAZARDOUS OR SOLID.....	95
CHAPTER 4 - CONSULTATION AND COORDINATION	98
4.1 List of Preparers and Participants	98
CHAPTER 5 - REFERENCES.....	100

List of Tables

Table 1 – Air Quality: Ambient Air Quality Standards	17
Table 2 – Air Quality: Ambient Air Quality Monitoring Data Trends	18
Table 3 – Air Quality: Estimated Maximum Annual Emissions (2013) from San Francisco Creek	21
Table 4 – Air Quality: Proposed Action & Rio Grande County Emissions Comparisons	22
Table 5 – Air Quality: Greenhouse Gas Emission Comparisons.....	24
Table 6 – Soils: Soil properties (Map Unit: 146 Guben-Luhon association)	35
Table 7 – Wildlife: Direct, Indirect, and Cumulative Effects/Impacts on Threatened, Endangered, Candidate, and Sensitive species for the San Francisco Creek APD Project	53
Table 8 – Wildlife: Mapped habitat availability within the 6 th level watershed, Including Acres affected by proposed project.	73
Table 9 – Migratory Birds: USFWS Birds of Conservation Concern (BCC) for Bird Conservation Region 16 and their status within the project area	78
Table 10 – Socioeconomics: Rio Grande County Demographics	93
Table 11 – Socioeconomics: Rio Grande County Demographics (Race, Ethnicity, Income).....	95

List of Figures

Figure 1 – Project Area Map	11
Figure 2 – Air Quality: COGCC Well Location & Colorado Air Pollution Control Division Class 1 Areas	16
Figure 3 – Geology: Generalized Stratigraphic column for the San Juan Sag Region.....	28
Figure 4 – Geology: Simplified Geologic Map of the San Juan Region	29
Figure 5 – Geology: Map of USGS San Juan Sag oil and gas play.....	30
Figure 6 – Soils: Map Unit: 146—Guben-Luhon association	33
Figure 7 – Wells, Springs, and Streams within the San Francisco Creek Watershed	38
Figure 8 – Wells, Springs, and Streams in the project area	39
Figure 9 – Vegetation: View of Proposed Access Road, looking South from Wagon Wheel Rd. .	46
Figure 10 – Wildlife: Water Flow Path from Proposed Well Site.....	64
Figure 11 – Wildlife: Hauling Road Stream Crossings	65
Figure 12 – Wildlife: Elk Habitat Near Proposed Well Site	70
Figure 13 – Wildlife: Mule Deer Habitat Near Proposed Well Site	71
Figure 14 – Wildlife: Pronghorn Habitat Near Proposed Well Site.....	72
Figure 15 – Visual Resources: Key Observation Point 1 (KOP 1)	89
Figure 16 – Visual Resource: Key Observation Point 2 (KOP 2)	90

CHAPTER 1 - INTRODUCTION

1.1 IDENTIFYING INFORMATION

PROJECT TITLE: DOI-BLM-CO-300-2012-012-EA San Francisco #1 APD

PLANNING UNIT: San Luis Valley Field Office, San Luis Resource Area, Front Range District

LEGAL DESCRIPTION: The San Luis Valley Field Office administers lands within the San Luis Resource Area (SLRA). T. 39 N., R. 5 E. Section 24, NWSE, New Mexico Principal Meridian; Rio Grande County, Colorado

APPLICANT: Dan A. Hughes Company

1.2 INTRODUCTION AND BACKGROUND

BACKGROUND: This Environmental Assessment (EA) has been prepared by the Bureau of Land Management (BLM), San Luis Valley Field Office to analyze the potential environmental impacts of the Dan A. Hughes Company (DAHC) – San Francisco Creek #1 well, as proposed by the DAHC in their Application for Permit to Drill (APD) dated December 8, 2011. The EA will assist the BLM in determining whether significant impacts could result from the proposed action. The analysis is an important element in the decision making process but it is also required for compliance with the National Environmental Policy Act (NEPA). “Significance” is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of “Finding of No Significant Impact” (FONSI). If the decision maker determines that this project has “significant” impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a Decision Record may be signed for the EA approving the selected alternative, whether the proposed action or another alternative. A Decision Record (DR), including a FONSI statement, documents the reasons why implementation of the selected alternative would not result in “significant” environmental impacts beyond those addressed in San Luis Resource Management Plan (RMP), approved in December 1991. BLM decisions issued as a result of this EA would apply only to BLM administered public lands (mineral estate).

The environmental impacts being analyzed are associated with road and drill pad construction, as well as the development of an exploratory oil and gas well on split-estate lands in Rio Grande County, approximately 5 miles south of Del Norte, Colorado as described in the APD. DAHC proposes to drill an exploratory well from a well pad in the North West¼ of the Southwest 1/4 of Section 24, Township 39 North, Range 5 East., New Mexico Principal Meridian (NE1/4SW1/4S24T39NR5E NMPM), (See Figure 1, Project Map). All development work will take

place on the private surface owned by DAHC with the federal mineral estate administered by the BLM's San Luis Valley Field Office.

1.3 PURPOSE AND NEED

This EA is prepared in compliance with the NEPA, as amended (Public Law [PL] 91-90, 42 USC 4321 et seq.). This EA has been prepared in compliance with all applicable regulations and laws passed subsequent to NEPA, including Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] § 1500-1508); U.S. Department of the Interior (USDI) requirements (Department Manual 516, Environmental Quality [USDI 2004]); and BLM guidelines in Handbook H-1790-1 (USDI/BLM 2008a).

The purpose of the action is to respond to the APD submitted by the DAHC and evaluate the environmental impacts of the proposal to drill an exploratory well and associated surface infrastructure. The need for the action is to approve, deny, or approve with modifications to the APD as submitted by the DAHC.

The BLM's policy is to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs in accordance with BLM's multiple-use mandate under the Federal Land Policy and Management Act of 1976 (FLPMA). The BLM oil and gas leasing program promotes the development of domestic oil and gas resources and the reduction of U.S. dependence on foreign energy sources. Oil and gas exploration and development is recognized as an appropriate use of public lands in the RMP that provides management direction for the leased area. BLM will consider the proposed exploratory drilling and access in a manner that avoids or reduces impact on other resources and activities as identified in the RMP. The need for the action is established by the BLM's authority under the Mineral Leasing Act, the Mining and Minerals Policy Act of 1970 (30 USC § 21 et seq.), the FLPMA (43 USC § 1701 et seq.), the National Materials and Minerals Policy, Research, and Development Act of 1980 (30 USC § 1601 et seq.), and the Federal Onshore Oil and Gas Leasing Reform Act of 1987 (30 USC § 181 et seq.).

1.4 DECISION TO BE MADE

The BLM will decide whether to approve the proposed San Francisco Creek #1 Well based on the analysis contained in this Environmental Assessment (EA). This EA will analyze the proposed action to construct a well pad and access road, in order to drill and develop federal minerals from a private surface location. Access to the proposed well pad would be on existing

county and rural roads. The finding associated with this EA may not constitute the final approval for the proposed action. The BLM may choose to: a) implement the project as proposed, b) implement the project with modifications/mitigation, c) implement an alternative to the proposed action, or d) not implement the project at this time.

1.5 PLAN CONFORMANCE REVIEW

PLAN CONFORMANCE REVIEW: The Proposed Action is subject to and has been reviewed for conformance with the following plan (43 CFR 1610.5, BLM 1617.3):

Name of Plan: San Luis Resource Area Resource Management Plan

Date Approved: December 18, 1991

Decision Number: SLVRA RMP.ROD, Chapter 2, page 8. Approved on December 18, 1991

Decision: “Federal and split-estate lands will be open to leasing under standard lease terms...”

In January 1997, the Colorado State Office of the BLM approved the Standards for Public Land Health and amended all RMPs in the State. Standards describe the conditions needed to sustain public land health and apply to all uses of public lands.

Standard 1: Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic processes.

Standard 2: Riparian systems associated with both running and standing water function properly and have the ability to recover from major disturbance such as fire, severe grazing, or 100-year floods.

Standard 3: Healthy, productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species and habitat’s potential.

Standard 4: Special status, threatened and endangered species (federal and state), and other plants and animals officially designated by the BLM, and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities.

Standard 5: The water quality of all water bodies, including ground water where applicable, located on or influenced by BLM lands will achieve or exceed the Water Quality Standards established by the State of Colorado.

Because standards exist for each of these five categories, a finding must be made for each of them in an environmental analysis. These findings are located in Chapter 3 of this document.

1.6 SCOPING, PUBLIC INVOLVEMENT AND ISSUES

Scoping is the process used to solicit internal and external input on the issues, impacts, and potential alternatives that will be addressed in an EA as well as the extent to which those issues and impacts will be analyzed. While scoping for an EA is optional (40 CFR 1501.7), BLM determined that this analysis would benefit from public input.

On August 20, 2012, the San Luis Valley Field Office announced a 30-day scoping period for the San Francisco Creek #1 E A. The BLM also held a public scoping meeting on September 6, 2012 at the Rio Grande County Annex in Del Norte. Over the course of the 30-day period the BLM received 42 written comments addressing a wide range of resource concerns and issues.

Based on BLM NEPA guidance, , an “issue” is a point of disagreement, debate, or dispute with a proposed action based on some anticipated environmental effect. An issue is more than just a position statement – such as disagreeing with oil and gas development of the federal mineral estate. An issue has a cause and effect relationship with the proposed action or alternatives; is within the scope of the analysis; has not been decided by law, regulation, or previous decision; and is amenable to scientific analysis rather than conjecture.

The public comments we received identified many issues that we address within this environmental analysis, such as water and air quality (sections 3.2.4 & 3.2.1), wildlife (section.3.3), visual resources (section 3.4.3), and geology (section 3.2.2).

However, there were also scoping comments that did not constitute an “issue” requiring analysis under NEPA. Some examples of those concerns include statements about whether or not oil and gas development is necessary (generally expressed as a “favor” or “oppose” position statement); concerns regarding potential for a larger oil field development if producible quantities of minerals are discovered (outside the scope of this analysis); and the effect of local land-use ordinances on BLM authority (previously decided by law).

The BLM also received many comments encouraging consideration of the Rio Grande County Hydrology study. While not generally part of a routine EA for an APD, the BLM was able to work cooperatively with the Rio Grande County team to consider their findings within our analysis.

The BLM released a draft of this EA on June 18th, 2013 and extended the comment period for a total of 45 days. The BLM received over 40 comments on the draft and carefully considered every comment. Based on the comments received, we supplemented, improved, and modified this analysis where appropriate. Additionally, the BLM has summarized the most common comments and provided written responses in Appendix A – Written Comment Responses.

CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter outlines the Proposed Action and the No Action alternative. The alternatives and objectives for this proposal were developed using the interdisciplinary team approach and by using on-the-ground knowledge and experience to develop a range of alternatives that meet the underlying need for the proposed action. The No Action Alternative is considered and analyzed to provide a baseline for comparison of the impacts of the proposed action.

The BLM has issued DAHC oil and gas lease COC-69530. The following Proposed Action outlines an exploration of that lease on a site-specific location. The proposed exploration action would be consistent with the terms and conditions of the existing lease. DAHC has the right, under the Federal lease terms, to drill elsewhere on its lease, including the right of access and the right of developing producible hydrocarbon resources.

2.2 ALTERNATIVES ANALYZED IN DETAIL

2.2.1 PROPOSED ACTION

The BLM has received an APD from the DAHC proposing the construction of a well pad and access road on private surface/Federal minerals (split estate) in Rio Grande County, south of Del Norte, Colorado. The DAHC proposed access road would be approximately 1,320 feet in length with 40 foot wide disturbance during construction, and 14 foot running width. The maximum grade for the new access road would not exceed 6.94% slope. There would be 2 culverts; a 12" culvert at the intersection of new and existing road, and an 18" culvert at the pad entrance. Additionally, a low water crossing would be utilized, armed with 1-¾" gravel to allow natural water flow to propagate down the watershed and alleviate the need for maintenance traditionally associated with sediment traps and culverts where sedimentation is a concern. The road will be improved with a 4 inch layer of road base and will have a crown and ditch design. The soil present at the site has approximately 20% clay content which in turn allows for adequate compaction. This should allow for relative stability of fill areas and alleviate the need for resurfacing due to surface material sinking. During new road construction the top soil will be stripped, stored, and used for interim reclamation. Top and subsoil stock piles will be protected from erosion with the use of tracking perpendicular to the slope with machinery and with application of hydro mulch.

The DAHC is proposing construction of a drill pad with a surface disturbance of approximately 2.3 acres and a maximum cut of 6.95 feet and maximum fill of 8.43 feet. Approximately six inches of top soil will be stripped from the middle of the pad site and stockpiled at both the east and west sides. This will help prevent mixing the two different soil structures observed at the site. Any soil and sub soil not used for the drill pad construction will be stockpiled and hydromulched to prevent erosion and sedimentation. The hydromulch color will be consistent with BLM's standard environmental colors in an effort to blend in with the natural landscape and reduce visual contrast. The pad will be enclosed with a straw bale berm to minimize drilling noise, fugitive dust, and reduce visual impacts. The straw bales are 4 feet tall and 8 feet long and will be stacked three high for a total height of 12 feet. The straw bales will be treated with a fire suppressor in order to prevent ignition and potential fire. Sediment fences will be erected to minimize sediment deposition in a nearby ephemeral drainage and along the access road. The proposed sediment fence would be constructed with the use of matting, wooden lathes, and straw wattles. The matting would be "keyed-in" for maximum effectiveness. All fill slopes will be 3:1 and treated with hydromulch to prevent erosion. Fill slopes will be tracked in a perpendicular orientation to the slope using machinery to roughen the surface which should reduce erosion and trap moisture.

DAHC is proposing a wildcat drilling operation with a proposed depth of 6,600 feet targeting the Dakota and Morrison horizons. The drilling operation will pass through the Conejos, Blanco Basin, and Mancos formations before encountering the Dakota and Morrison formations. The drilling operation is expected to take 45 days. The specific casing, cementing, and mud programs are detailed in the Drilling Well Plan submitted by DAHC as part of the APD. No waste pits or flare stacks are being proposed. The operator will utilize a gas-buster to flare if necessary.

In the event of a dry hole, the pad and access road will be graded to original contour, topsoil will be replaced and the entire area reseeded according to the Surface Use Plan of Operations. Rehabilitation of the well pads and access roads are bonded to ensure compliance with BLM reclamation requirements. The APD includes a drilling plan and a surface use plan of operations that would be implemented consistent with the terms of Federal Lease COC-69530 , Onshore Order #2, and Conditions of Approval as developed by BLM.

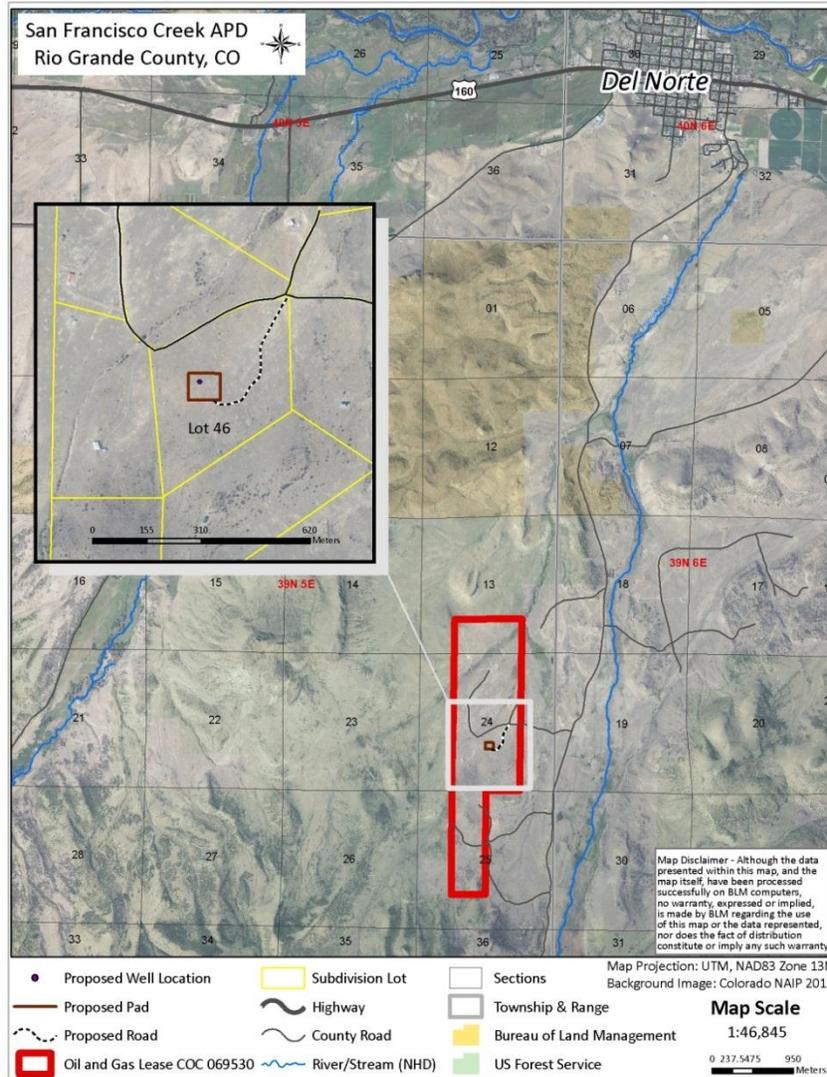


FIGURE 1 – LOCATION OF PROPOSED PROJECT

2.2.2 NO ACTION ALTERNATIVE

The proposed action involves Federal subsurface minerals that are encumbered with a Federal oil and gas lease, which grants the lessee a right to explore and develop the lease. Although BLM cannot deny the right to drill and develop the leasehold, individual APDs can be denied to prevent unnecessary and undue resource degradation. The no action alternative constitutes denial of the APDs associated with the proposed action. Under the no action alternative, therefore, none of the proposed developments described in the proposed action would take place.

2.2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

A number of commenters requested the BLM analyze a further build-out of oil and gas infrastructure in anticipation of a larger-scale development than what has been proposed by the applicant. While the BLM took a hard look at this possibility, it was determined that analyzing such an alternative would be speculative at this time based on the lack of a proposed action for specific infrastructure improvements. Should the need for additional infrastructure arise, the BLM would require additional NEPA analysis. NEPA requires the analysis of reasonably foreseeable actions, which is defined in the BLM NEPA Handbook as “actions for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends.” The lack of a specific proposal would make such an alternative speculative in nature.

CHAPTER 3 - AFFECTED ENVIRONMENT AND EFFECTS

3.1 INTRODUCTION

This section provides a description of the human and natural environmental resources that could be affected by the Proposed Action and presents comparative analyses of the direct, indirect and cumulative effects on the affected environment stemming from the implementation of the actions under the Proposed Action and other alternatives analyzed.

3.1.1 INTERDISCIPLINARY TEAM REVIEW

The following table 3.1 is provided as a mechanism for resource staff review, to identify those resource values with issues or potential impacts from the proposed action and/or alternatives. Those resources identified in the table as impacted or potentially impacted will be brought forward for analysis.

Resource	Initial and date	Comment or Reason for Dismissal from Analysis
Air Quality Chad Meister, COSO	CM 02/28/2013	See Affected Environment.
Geology/ Minerals Nicolas Sandoval	NS 02/12/2013	Resources are present but not potentially impacted. See affected environment for geologic description.
Soils Negussie Tedela	NT 03/13/2013	Present and potentially impacted. See affected environment section.
Water Quality - Surface and Ground Negussie Tedela	NT 03/13/2013	Present and potentially impacted. See affected environment section.
Invasive Plants Mark Swinney/Alyssa Radcliff	MAS 2/28/2013	Present and potentially impacted. See affected environment section.
T&E and Sensitive Species Sue Swift Miller, Eduardo Duran	SSM 2/21/2013	Present and potentially impacted. See affected environment section.
Vegetation Melissa Shawcroft	MS, 12/2/2013	Present and potentially impacted. See affected environment section.
Wildlife Aquatic Sue Swift Miller/Alyssa Radcliff	SSM 2/21/2013	Present and potentially impacted. See affected environment section.
Wildlife Terrestrial Sue Swift Miller/Alyssa Radcliff	SSM 2/21/2013	Present and potentially impacted. See affected environment section.
Migratory Birds Sue Swift Miller/Alyssa Radcliff	SSM 2/21/2013	Present and potentially impacted. See affected environment section.

Resource	Initial and date	Comment or Reason for Dismissal from Analysis
Cultural Resources Angie Krall	AK 2/13/2013	Present and potentially impacted. See affected environment section.
Native American Religious Concerns Angie Krall	AK 2/13/2013	See affected environment section.
Economics David Epstein(SO), Martin Weimer	mw, 2/1/13	Present and potentially impacted. See affected environment section.
Paleontology		There are no Paleontological Resources within the proposed project areas, and no Paleontological Resources would be affected by the Proposed Action. Therefore, this resource will not be brought forward for analysis.
Visual Resources Sean Noonan	SN, 10/6/12	Present and potentially impacted. See affected environment section.
Environmental Justice David Epstein, Martin Weimer	mw, 2/1/13	Present and potentially impacted. See affected environment section.
Wastes Hazardous or Solid Leon Montoya	LM, 9/13/12	Present and potentially impacted. See affected environment section.
Recreation Sean Noonan	SN, 10/6/12	Surface Estate is Private Property. Therefore, this BLM program resource will not be mentioned further within this document.
Farmlands Prime and Unique Eduardo Duran		There are no Prime or Unique Farmlands within the proposed project areas, and no Prime or Unique Farmlands would be affected by the Proposed Action. Therefore, this resource will not be brought forward for analysis.
Lands and Realty Leon Montoya	LM, 8/16/12	Surface Estate is Private Property. Therefore, this BLM program resource will not be mentioned further within this document.
Wilderness, WSAs, ACECs, Wild & Scenic Rivers Sean Noonan	SN, 10/6/12	There are no Wilderness, WSA's, ACEC's or Wild and Scenic Rivers within the proposed project area, and no Wilderness, WSA's, ACEC's or Wild and Scenic Rivers would be affected by the Proposed Action. Therefore, this resource will not be brought forward for analysis.
Wilderness Characteristics Sean Noonan	SN, 10/6/12	There are no Wilderness Characteristics within the proposed project area, and no Wilderness Character would be affected by the Proposed Action. Therefore, this resource will not be brought forward for analysis.
Range Management Mark Swinney,	MAS 2/28/2013	Surface Estate is Private Property. Therefore, this BLM program resource will not be mentioned further within this document.
Forest Management	PSM, 1/31/13	Surface Estate is Private Property. Therefore, this BLM program resource will not be mentioned further within this document.
Cadastral Survey Joe Velasquez, Leon Montoya, Sean Hines	LM 8/16/12	Surface Estate is Private Property. Therefore, this BLM program resource will not be mentioned further within this document.
Noise Martin Weimer, Project Lead, SO	mw, 2/1/13	The project area is rural in nature and in open rangeland. Certain levels of noise are associated with drilling operations, these include drill rig operation, compressors/generators and general machine and vehicle operation. These impacts are temporary and terminate when drilling operations are complete.
Fire Paul Minow	PSM, 1/31/13	Surface Estate is Private Property. Therefore, this BLM program resource will not be mentioned further within this document.

The potentially affected resources brought forward for analysis include:

- Air Quality and Climate
- Geology & Minerals
- Soils
- Water Quality
- Vegetation & Invasive Plants
- Wildlife Terrestrial
- Wildlife Aquatic
- Migratory Birds
- Wastes Hazardous or Solid
- Threatened & Endangered Species
- Cultural Resources
- Visual Resources
- Economics
- Environmental Justice

3.2 PHYSICAL RESOURCES

3.2.1 AIR QUALITY AND CLIMATE

Affected Environment:

The proposed action area (Rio Grande County) generally has good air quality and is classified as attainment for all criteria pollutants with respect to the National Ambient Air Quality Standards. Mean temperatures in the area range from 6.7 degrees Fahrenheit in January to 78.5 degrees Fahrenheit in July. The area receives average annual precipitation of approximately 9.83 inches that is predominately distributed during the summer with lesser amounts in spring and fall, and very little moisture in winter.

Activities occurring within the area that affect air quality include exhaust emission from cars, drilling rigs, agricultural equipment, and other vehicles, as well as fugitive dust from roads, agriculture, and energy development. According the COGCC , there are currently no producing oil and gas wells located within the vicinity of the proposed action area (Figure 2).

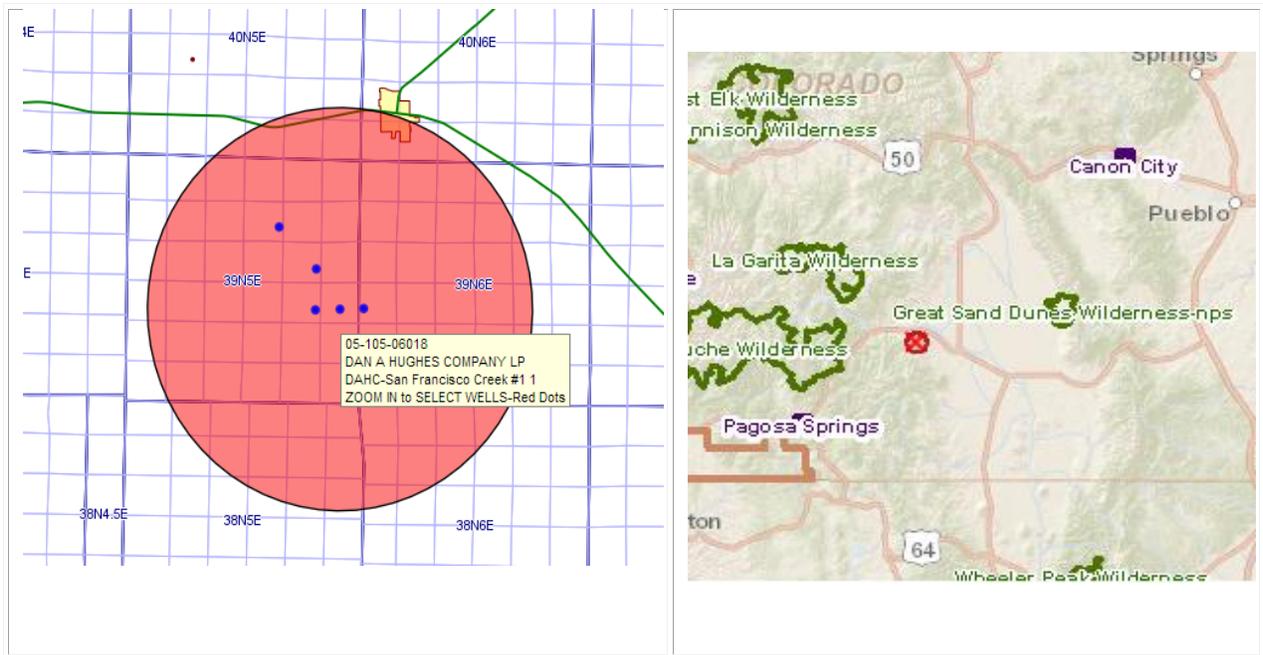


FIGURE 2 - COGCC WELL LOCATION DATA (LEFT); AND COLORADO AIR POLLUTION CONTROL DIVISION 1 MAP (RIGHT) SHOWING CLASS 1 AREAS OUTLINED IN GREEN.

Regulatory Framework: The Clean Air Act (CAA), which was last amended in 1990, requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for criteria pollutants. Criteria pollutants are air contaminants that are commonly emitted from the majority of emissions sources and include carbon monoxide (CO), lead (Pb), sulfur dioxide (SO₂), particulate matter smaller than 10 & 2.5 microns (PM₁₀ & PM_{2.5}), ozone (O₃), and nitrogen dioxide (NO₂).

The CAA established 2 types of NAAQS:

Primary standards: Primary standards set limits in order to protect public health, including the health of "sensitive" populations (such as asthmatics, children, and the elderly).

Secondary standards: Secondary standards set limits in order to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings.

The EPA regularly reviews the NAAQS (every five years) to ensure that the latest science on health effects, risk assessment, and observable data such as incidence rates are evaluated in order to re-propose any NAAQS to a lower limit if the data supports the finding.

The Colorado Air Pollution Control Division (CAPCD), by means of an approved State Implementation Plan (SIP) and/or delegation by EPA, can establish state ambient air quality

standards for any criteria pollutant that is at least as stringent as, or more so, than the federal standards. Ambient air quality standards must not be exceeded in areas where the general public has access. Table 1 lists the federal and state ambient air quality standards and Table 2 illustrates Ambient Air Quality Monitoring Data Trends.

TABLE 1 - AMBIENT AIR QUALITY STANDARDS (EPA 2011)

Pollutant [final rule cite]		Primary/ Secondary	Averaging Time	Level	Form
<u>Carbon Monoxide</u> [76 FR 54294, Aug 31, 2011]		Primary	8-hour	9 parts per million (ppm)	Not to be exceeded more than once per year
			1-hour	35 ppm	
<u>Lead</u> [73 FR 66964, Nov 12, 2008]		primary and secondary	Rolling 3 month average	0.15 per cubic meter ($\mu\text{g}/\text{m}^3$)	Not to be exceeded
<u>Nitrogen Dioxide</u> [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		primary	1-hour	100 parts per billion (ppb)	98th percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb	Annual Mean
<u>Ozone</u> [73 FR 16436, Mar 27, 2008]		primary and secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
<u>Particle Pollution</u> [71 FR 61144, Oct 17, 2006]	PM _{2.5}	primary and secondary	Annual	12 $\mu\text{g}/\text{m}^3$	Annual mean, averaged over 3 years
			24-hour	35 $\mu\text{g}/\text{m}^3$	98th percentile, averaged over 3 years
	PM ₁₀	primary and	24-hour	150	Not to be exceeded

		secondary		$\mu\text{g}/\text{m}^3$	more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary	Annual	0.03 ppm	Arithmetic Average
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

TABLE 2 - AMBIENT AIR QUALITY MONITORING DATA TRENDS FROM TWO COLORADO AIR POLLUTION CONTROL DIVISIOIN SITES IN ALAMOSA, COLORADO (CDPHE 2009 – 2012, EPA FORMS)

Monitor	Pollutant (Standard)	2009	2010	2011	2012
4 th St. , Alamosa, CO	PM ₁₀ (24hr - $\mu\text{g}/\text{m}^3$)	107	109	118	116
208 Edgemont Blvd., Alamosa, CO	PM ₁₀ (24hr - $\mu\text{g}/\text{m}^3$)	94	106	130	117

¹ The nearest CAPCD air monitors to the project site are located at 425 4th St. & 208 Edgemont Blvd. in Alamosa, CO 81101.

The CAA and the Federal Land Policy and Management Act of 1976 (FLPMA) require BLM and other federal agencies to ensure actions taken by the agency comply with federal, state, tribal, and local air quality standards and regulations. FLPMA further directs the Secretary of the Interior to take any action necessary to prevent unnecessary or undue degradation of the lands [Section 302 (b)], and to manage the public lands “in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values” [Section 102 (a)(8)].

The project area is designated as a Class II Area, as defined by the Federal Prevention of Significant Deterioration (PSD) provision of the CAA. The PSD Class II designation allows for moderate growth or degradation of air quality within certain limits above baseline air quality. The closest PSD Class I designation allows minor deterioration of air quality these areas are

approximately 55 miles to the west of the proposed action area includes La Garita and Weminuche Wilderness as well as the Great Sand Dunes National Park.

Environmental Effects:

Proposed Action

Direct and Indirect Impacts:

The proposed action could have a temporary negative impact on air quality which would mostly occur during the construction phase. Utilization of the access road, surface disturbance, and construction activities such as drilling, hydraulic fracturing, well completion, and equipment installation could impact air quality through the generation of dust related to travel, transport, and general construction. This phase could also produce short term emissions of criteria, hazardous, and greenhouse gas pollutants from vehicle and construction equipment exhausts. Once construction is complete the daily activities at the site would be reduced to operational and maintenance checks which may be as frequent as daily visits. Emissions will result from vehicle exhausts from the maintenance and process technician visits, as well as oil and produced water collection or load out trips. The pads can be expected to produce fugitive emissions of well gas and liquid flashing gases, which can contain a mixture of methane, volatile organic compounds, and inert or non-regulated gases. Fugitive emissions may result from pressure relief valves and working and breathing losses from any tanks located at the site, as well as any flanges, seals, valves, or other infrastructure connections used at the site. Liquid product load-out operations and pipeline transport can also generate fugitive emissions of VOCs.

Ozone is not directly emitted like other criteria pollutants. Ozone is chemically formed in the atmosphere via interactions of oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions (NO_x and VOCs are ozone precursors). Ozone formation and prediction is complex, generally results from a combination of significant quantities of VOCs and NO_x emissions from various sources within a region, and has the potential to be transported across long ranges. Therefore, it is typically not appropriate to assess (i.e. model) potential ozone impacts of a minor project on potential regional ozone formation and transport. However, the State of Colorado assesses potential ozone impacts from its authorizing activities on a regional basis when an adequate amount of data is available and where such analysis has been deemed appropriate. No such work has ever been performed for the Rio Grande County area, since its relatively minor emissions are not expected to contribute to any regional ozone formation potential. For this reason (inappropriate scale of analysis), ozone will not be further addressed in this document beyond

the related precursor discussions, and an appropriate qualitative analysis/comparison to background emissions inventories for the county (see cumulative impacts).

Emission estimates from the proposed well site were calculated for this EA (Table 3). The emissions inventory (EI) considered reasonably foreseeable oil and gas development activities for the proposed well and includes emissions from both construction and production operations. The following pollutants were inventoried where an appropriate basis, methodology, and sufficient data exists: Carbon Monoxide (CO), mono-nitrogen oxides (NOX) (includes nitrogen dioxide (NO₂)), Particulate Matter 2.5 micrometers (PM_{2.5}), Particulate Matter 10 micrometers (PM₁₀), sulfur dioxide (SO₂), volatile organic compounds (VOCs), hazardous air pollutants (HAPs), carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). The EI was developed using reasonable but conservative scenarios for each activity. Production emissions were calculated based on full production activity for an entire year (e.g., 2013), and since this will not be the case in reality, the production emissions are conservative. Potential emissions were calculated for the well assuming the minimum/basic legally required control measures, site specific voluntary operator controls, operational parameters, and any equipment configurations data that was provided by the applicant.

The following assumptions were applied consistently to all potential activities:

- The EI used a disturbed surface area of 3 acres for the well pad and access road construction.
- The EI assumed 20 acres of disturbed surface for any pipeline construction.
- All disturbed surfaces (pads and access roads) would receive appropriate application of water (during construction) or dust palliatives (during operations), but were calculated to achieve a 0 % dust control factor to be conservative.
- All diesel fuel would be standard #2 grade (500 ppm sulfur).
- The well pad equipment would include tanks, separation equipment, and well head compression, but no dehydration or desulfurization units.
- Drill rigs emissions were based on EPA Non-road Tier 2 emissions standards.

TABLE 3 - ESTIMATED MAXIMUM ANNUAL EMISSIONS (2013) FROM THE PROPOSED PROJECT

Total Emissions (Tons per Year)									
Pollutant:	NO _x	CO	VOC	SO ₂	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O
Construction Phase:	0.47	0.29	0.04	0.0001	1.99	0.06	33.84	0.001	0.0003
Development Phase:	14.76	2.97	0.75	0.0002	4.89	0.49	2133.22	1.02	0.0517
Operation Phase:	0.39	0.36	2.98	0.0001	0.04	0.23	390.71	13.09	0.0008
Total:	15.63	3.62	3.77	0.0004	6.93	0.77	2557.77	14.11	0.0527

Total Emissions (Tons per Year)							CO ₂ equivalence (Global Warming Potential)	
Pollutant:	Benzene	Toluene	Ethylbenzene	Xylene	n-Hexane	HAPs	Total TPY:	2870.49
Construction Phase:	0.00	0.00	0.00	0.00	0.00	0.00	CO ₂ equivalence conversions:	
Development Phase:	1.36	0.95	0.00	0.55	1.67	0.03	CO ₂	1.00
Operation Phase:	0.04	0.02	0.00003	0.011	0.19	0.25	CH ₄	21.00
Total:	1.40	0.97	0.00003	0.56	1.85	0.28	N ₂ O	310.00

H ₂ S Emissions	
Total TPY:	0.00

Table 4 demonstrates a relative comparison of the estimated project emissions to Rio Grande County’s total emissions from 2008. It also shows Rio Grande County’s oil and gas area and point source emissions for the same period.

TABLE 4 – COMPARISON OF AIR EMISSIONS RESULTING FROM THE PROPOSED ACTION & RIO GRANDE COUNTY EMISSIONS ¹

POLLUTANT	Emissions, Tons per year			
	San Francisco Creek	Rio Grande County Total Emissions (2008)	Rio Grande County Oil & Gas Area Source Emissions	Rio Grande County, Oil & Gas Point Source Emissions
NO _x	15.63	837	ND	5.22
CO	3.62	6,559	ND	5.22
VOC	3.77	957	ND	1.57
PM ₁₀	6.93	1,558	ND	0.05
PM _{2.5}	0.77	528	ND	ND
SO _x	0.0004	26	ND	0.003
HAPs	0.28	195	ND	0.003

¹ 2008 EPA NEI, CDPHE 2008 APEN Database/Emissions Inventory (most current available). ND = No Data. CDPHE HAP inventory is for benzene only.

The project emissions are relatively small compared to the aggregate County emissions, less than 0.3%. APCD published modeling guidance (Colorado Modeling Guideline for Air Quality Permits - January 2002, April 2010) that established thresholds for requiring additional analysis when emissions are exceeded on an annual or short term basis. The modeling thresholds were developed to identify new sources and modifications that would have relatively small impacts on ambient air quality and would not warrant further analysis with respect to applicable standards with a few exceptions. The thresholds (de minimis emissions) establish levels of emissions which have a low probability of causing or contributing to an exceedance of an air quality standard. The calculated emissions for the proposed action are below the APCD established thresholds. Although not specifically a stationary source (i.e., most of the sources are mobile, and would have minimal emissions occurring at the individual sites), the context

allows for a reasonable analysis of the estimated worst case emissions that suggests the projects would have insignificant impacts to regional air quality.

Greenhouse Gas Emissions and Climate Change: According to the U.S. Global Change Research Program (2009), global warming that has occurred over the past 50 years is primarily human-caused. Standardized protocols designed to measure factors that may contribute to climate change, and to quantify climatic impacts, are presently unavailable. Moreover, specific levels of significance have not yet been established by regulatory agencies. Predicting the degree of impact any single emitter of greenhouse gases (GHGs) may have on global climate, or on the changes to biotic and abiotic systems that accompany climate change is highly complex, has considerable uncertainty, and requires intense computer modeling (i.e., super computers). As such, no readily available tools exist to predict impacts a project's emissions would have on the global, regional, or local climate. This analysis is therefore limited to comparing the context of total project GHG emissions, and to emissions recently analyzed by EPA. The analysis also discloses readily available information regarding expected changes to the global climatic system and any empirical evidence of climate change that has occurred to date (see cumulative impacts).

The implementation of the proposed action is estimated to contribute 2,870 tons of carbon dioxide equivalent (CO₂(e)) in the maximum year (2013). Annual operating GHG emissions will be 23% of the total emissions shown for the maximum year. Over the 25 year project timeframe, the total GHG emissions expected are approximately 3,427 tons. The total provided does not account for the ultimate use or consumption of any produced minerals at this time due to the fact that the ultimate form of use and any additional processing required to render the product to sufficient quality (which would cause changes to the quantity of product) cannot be predicted with any reasonable certainty. Additionally, it should be noted that production values could vary significantly over the life of the project, making any prediction of the quantities of GHG emitted highly speculative.

In 2007, the State of Colorado's GHG emissions were 124,000,000 metric tons. The proposed action's GHG emissions represent about 0.0023 % of the state of Colorado's GHG emissions (Table 5). The relative magnitude of greenhouse gas emissions associated with the development of the well is extremely small.

To provide additional context, the EPA has recently modeled global climate change impacts from a model source emitting 20% more GHGs than a 1500 megawatt coal-fired steam electric

generating plant (approx. 14,132,586 metric tons per year of CO₂; 273.6 metric tons per year of nitrous oxide; and 136.8 metric tons per year (mtpy) of methane). It estimated a hypothetical maximum mean global temperature value increase resulting from such a project. The results ranged from 0.00022 and 0.00035 degrees Celsius occurring approximately 50 years after the facility begins operation. The modeled changes are extremely small, and any downsizing of these results from the global scale would produce greater uncertainty in the predictions. The EPA concluded that even assuming such an increase in temperature could be downscaled to a particular location, it "would be too small to physically measure or detect," see Letter from Robert J. Meyers, Principal Deputy Assistant Administrator, Office of Air and Radiation re: "Endangered Species Act and GHG Emitting Activities (Oct. 3, 2008). The project emissions are a fraction of the EPA's modeled source and are shorter in duration, and therefore reasonable to conclude that the project would have no measurable impact on the climate.

TABLE 5 – GREENHOUSE GAS EMISSION FROM THE PROPOSED ACTION COMPARED TO GREENHOUSE GAS EMISSIONS IN COLORADO.

Inventory Description	CO ₂ e Emissions (10 ⁶ mtpy)	Proposed Action Percentage
Colorado (2007)	124	0.0023
Total US Greenhouse Gases ¹	6,957	0.00000041

¹Inventory of US Greenhouse Gas Emissions and Sinks: 1990–2008 (EPA 2010a) EPA Emissions

Cumulative Impacts:

The addition of the infrastructure needed to construct and drill the pad and well would have a cumulative impact to the area's air quality; however, given the existing level of development in the area and current air quality, the proposed well's impact would be very minor. The surface area is controlled by the company as to exclude public access, and as such, ambient air quality should not be affected by the proposed action. In the long term, if economical quantities of oil and gas are found, additional wells can be expected to be drilled on Federal, State, and private lands. This could result in a larger impact to air quality in the future. The area has only minimal oil and gas development and according to the COGCC database all of the areas well locations that have been drilled are dry and abandoned. Short term emissions and the lower likelihood of actual production make the probability of significant cumulative effects unlikely.

With respect to GHG emissions, the following predictions were identified by the EPA for the Mountain West and Great Plains region

(<http://www.epa.gov/Region8/climatechange/pdf/ClimateChange101FINAL.pdf>):

- The region will experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow will be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs will be drier.
- More frequent, more severe, and possibly longer-lasting droughts will occur.
- Crop and livestock production patters could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Drier conditions will reduce the range and health of ponderosa and lodge pole pine forests, and increase the susceptibility to fire.
- Grasslands and rangelands could expand into previously forested areas.
- Ecosystems will be stressed and wildlife such as the mountain line, black bear, long-nose sucker, marten, and bald eagle could be further stressed.

If these predictions are realized, there could be impacts to resources within the region. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils. Warmer temperatures with decreased snowfall could have an impact on a particular plants ability to sustain itself within its current range. An increased length of growing season in higher elevations could lead to a corresponding variation in vegetation and change in species composition. These types of changes would be most significant for special status plants that typically occupy a very specific ecological niche. Cool season plant species' spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened or endangered plants may be accelerated. Invasive plant species would be more likely to out-compete native species.

Increases in winter temperatures in the mountains could have impacts on traditional big game migration patterns. Due to loss of habitat, or due to competition from other species whose ranges may shift northward, the population of some animal species may be reduced. Warmer winters with less snow would impact the Canada lynx by removing a competitive advantage they have over other mountain predators. Earlier snowmelt could also have impacts on cold water fish species that occupy streams throughout the planning area. Climate change could affect seasonal frequency of flooding and alteration of floodplains, which could impact riparian

conditions. More frequent and severe droughts would have impacts on many wildlife species throughout the region as well as vegetative composition and availability of livestock forage in some areas. Climate change could increase the growing season within the region, however, so longer growing season in theory would result in more forage production provided there is sufficient precipitation. Drier conditions could have severe impacts on forests and woodlands. This could leave these forests and woodlands more susceptible to insect damage and at higher risk of catastrophic wildfires. Increased fire activity and intensity would increase greenhouse gas emissions.

Protective/Mitigation Measures:

Require Dan A. Hughes Company (DAHC) to use industry best practices, including watering, graveling, and reseeded to reduce fugitive dust emissions from vehicular traffic and disturbed surfaces. Interim reclamation practices in accordance with the BLM Gold Book Standards will be implemented in order to stabilize the site and prevent fugitive dust from being generated. In addition the following BLM requirements will apply:

- Process equipment will be permitted by Colorado Department of Public Health and Environment (CDPHE) in accordance with applicable requirements and required emissions standards to limit the facility's potential to emit and provide appropriate operating, monitoring, and recordkeeping requirements.
- All Drill Rig engines will be required to meet at minimum EPA Non-Road Tier II Emissions Standards (non-road diesel engines emission standard).
- Any FRAC Pump engines shall meet EPA Non-Road Tier III Emissions Standards (non-road diesel engines emission standards).

It is expected that the operator will comply with these requirements and make every effort to minimize emissions through good engineering and operating practices to the maximum extent practical.

No Action Alternative

Direct and Indirect Impacts:

None of the proposed action elements would be authorized and therefore none of the potential emissions would occur. No impacts to air quality would occur. The incremental increase to global GHG burden would not happen, however it is entirely likely the predicted climatic changes will occur regardless.

Protective/Mitigation Measures: Not Applicable.

3.2.2 GEOLOGIC AND MINERAL RESOURCES

Affected Environment:

The affected lands are within the foothills of the San Juan Mountains. This mountain range is the largest erosional remnant of an expansive (9,000 square miles) volcanic field, known as the San Juan Volcanic field, which covered most of the Southern Rocky Mountains in Oligocene and later time (Steven and Epis, 1968). Throughout the San Juan Mountains the general volcanic sequence includes the Conejos Formation which is characterized by the initial intermediate lavas and breccias that were erupted from numerous scattered volcanoes. (See figures 3 & 4) These were followed by explosive ash-flow eruptions of quartz latite and low-silica rhyolite. In Early Miocene the character of volcanism changed and basalt and minor rhyolite were erupted intermittently through the Miocene and Pliocene. (See Lipman and others, 1970.) The Conejos Formation is believed to be the primary aquifer within the San Francisco Creek Watershed and is considered to be highly heterogenous and anisotropic¹, specifically due to its sporadic faulting and fractured nature as well as the variable sedimentary formations derived from its volcanic deposition.

¹ *Anisotropic*: with different properties in different directions: describes something with physical properties that are different in different directions.

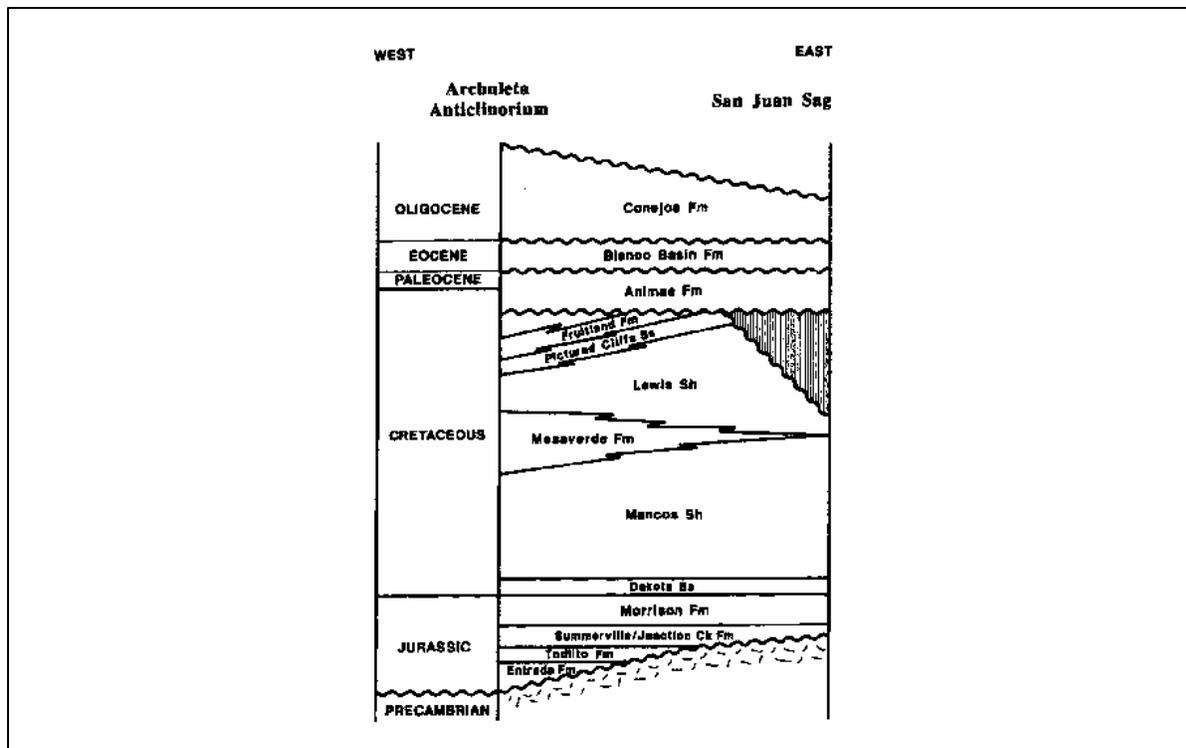


FIGURE 3 - GENERALIZED STRATIGRAPHIC COLUMN FOR THE SAN JUAN SAG REGION (FROM GRIES, 1989)

The San Juan volcanic field conceals a Laramide foreland basin known as the San Juan Sag. During most of the Late Cretaceous to Eocene Laramide Orogeny in the San Juan region, the San Juan Sag was a northeastern embayment of the San Juan Basin. It was modified by rifting in the middle Tertiary (Gries, 1989).

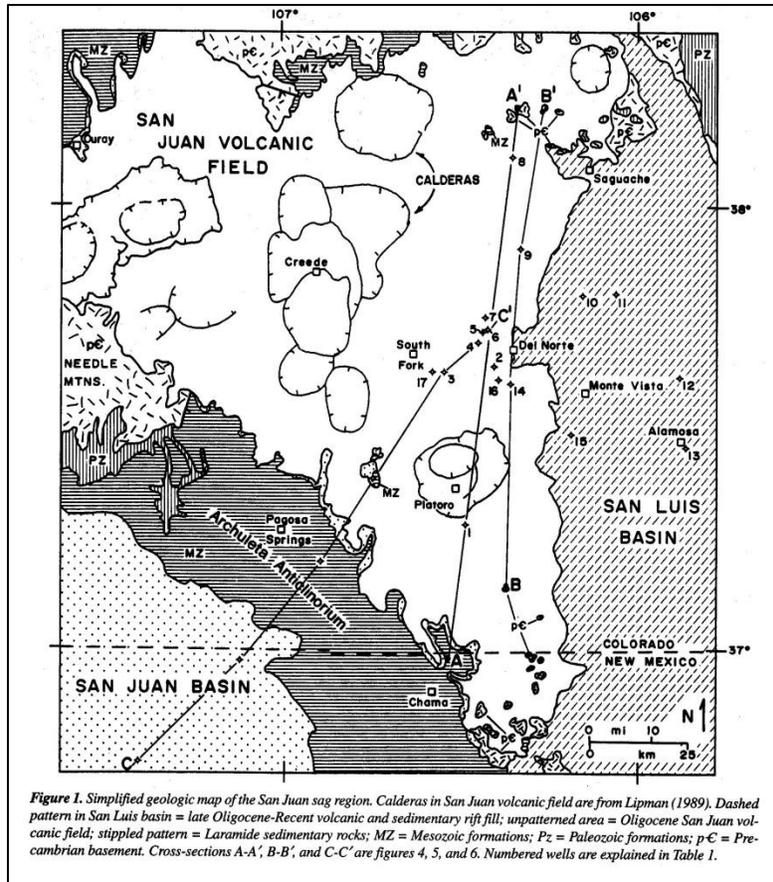


FIGURE 4 - SIMPLIFIED GEOLOGIC MAP OF THE SAN JUAN REGION (BRISTER AND CHAPIN, 1994)

Preserved within the San Juan Sag, are Jurassic through Eocene strata that include the San Juan Sag oil and gas play (Gries 1985). A play is “a set of oil or gas accumulations that are geologically, geographically, and temporally related and that exist by virtue of identical or similarly geological conditions” (Huffman and Molenaar, 1997). The San Juan Sag play is primarily an oil play in Cretaceous and Jurassic sandstones and possibly Oligocene igneous reservoirs (Molenaar, 1988). Oil and gas traps will most likely be structural, including both anticlinal and fault traps, with depths ranging from 6,000 ft. to 13,000 ft. (Holm and Dersch, 1995, p. 10.) The mean estimate of undiscovered recoverable conventional oil and gas in the play is 6.5 million barrels of oil and 7.0 billion cubic ft. of gas (Powers, 1993.) The San Juan Sag play covers a major part of the San Francisco Creek Watershed and the Rio Grande National Forest (Figure 5).

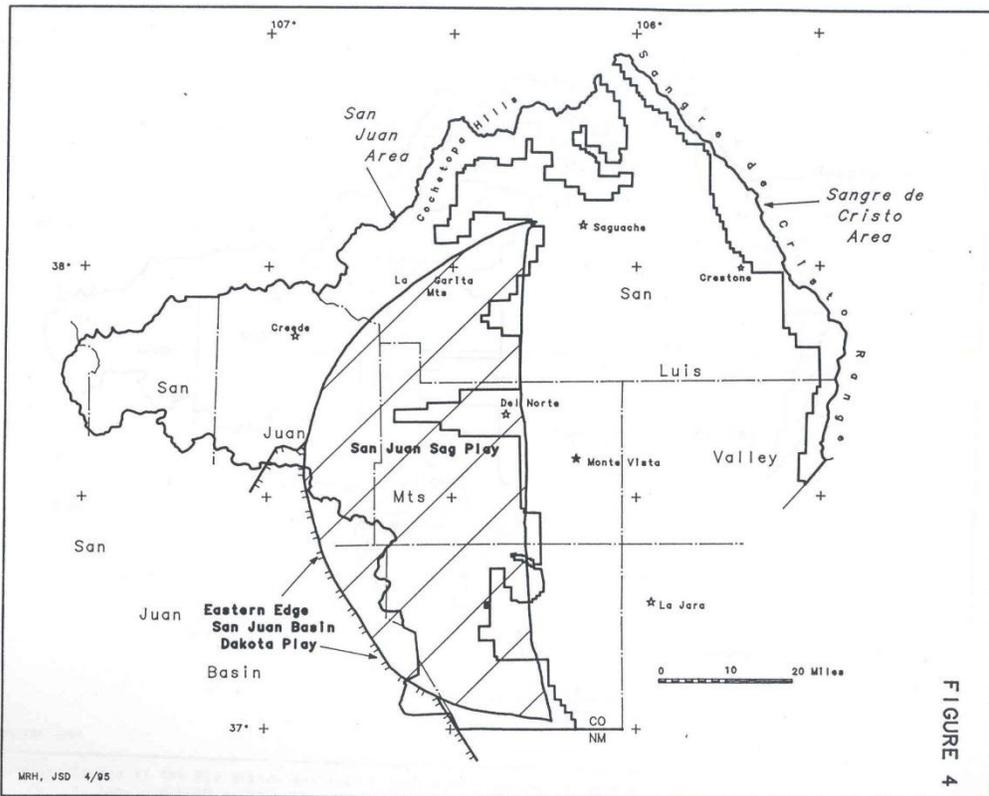


Figure 4: Map of the Rio Grande National Forest with USGS oil and gas plays.

FIGURE 5 - USGS SAN JUAN SAG OIL AND GAS PLAY (HOLM AND DERSH, 1995)

Environmental Effects

Proposed Action

Direct and Indirect Impacts:

The proposed drill pad will be located on relatively flat to slightly rolling upland area with sparse herbaceous vegetation, no trees, and no surface water. Implementation of the proposed action would include drilling through the Conejos Formation aquifer to potentially tap into oil and gas traps from the San Juan Sag oil and gas play. The proposed action could produce hydrocarbons and contribute to the national energy supply as well as lead to beneficial subsurface information about the Conejos Formation, the San Juan Sag, and the geologic interpretation of the area. If improperly done, the proposed action could lead to cross-contamination of water and hydrocarbon bearing aquifers.

Protective/Mitigation Measures:

BLM Onshore Order #2 (OO#2) requires that the proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. A review of the APD included a geologic evaluation of the potential subsurface formations that will be penetrated by the wellbore, as well as an engineering analysis of the drilling program to ensure the well construction design is adequate to protect the surface and subsurface environment, including the potential risks identified by the geologist, and all known or anticipated zones with potential risks.

The surface casing will be deepened from 1100' to 1400' to reduce the probability of contamination as a result of the 1400' deep water wells that are located in the vicinity.

Before drilling an intermediate hole, the surface casing will be cemented in place to surface between the casing and the formation, and also be pressure-tested to verify the success of the cementing job. In addition, BLM will require increased volumes of drilling mud and fresh water be readily available on location as a preventative measure to counter any downhole pressures that could be seen. Additional storage tanks will also be available onsite to handle excess volumes of water that could be seen from the Conejos Formation.

A BLM representative will be on site during the casing and cementing of groundwater-protective surface casing and other critical casing and cementing intervals constructed to isolate subsurface zones that present high risk for potential adverse impact to human health or safety or at high risk potential for environmental contamination.

A cement bond log will be required on the production casing (and the intermediate casing, if this is run), to ensure the quality of the cement bond between the casing and the formation. BLM regulations require at least 50 feet of cement above and below any producing interval, or any zone of interest. However, given the high potential for encountering vertical and horizontal natural fractures in the San Francisco Creek #1 well that could contribute to cross-flow and contamination, all casing that is run in the well will be cemented from bottom to top so that no casing will be exposed directly to the Conejos waters that are present, or to the targeted oil and gas formations that may be found at depth. Remedial cementing procedures will be required if it is determined that cementing doesn't meet BLM requirements.

No Action Alternative

Direct and Indirect Impacts:

Under the no action alternative APD would be denied and no action would occur. Although Federal subsurface minerals are encumbered with Federal oil and gas leases, which grant the lessee a right to explore and develop the leases.

Protective/Mitigation Measures: Not Applicable.

3.2.3 SOILS

Affected Environment:

Based on onsite soil investigations, most of the soils examined were in properly functioning condition, meaning that soil productivity is being maintained and the soil exhibits adequate vegetation and litter cover appropriate to soil type, climate, landform, and geologic processes of the area. Sheet/rill erosion is not excessive and no soil compaction is observed which would adversely affect infiltration and permeability. No active gullies and pedestals are present.

The Rio Grande County soil survey has identified the Guben-Luhon association, 0 to 20 percent slopes in the proposed project area (Figure 6). Soil descriptions for the Major components of this map unit (Guben (60%) and Luhon (25%)) are shown below.

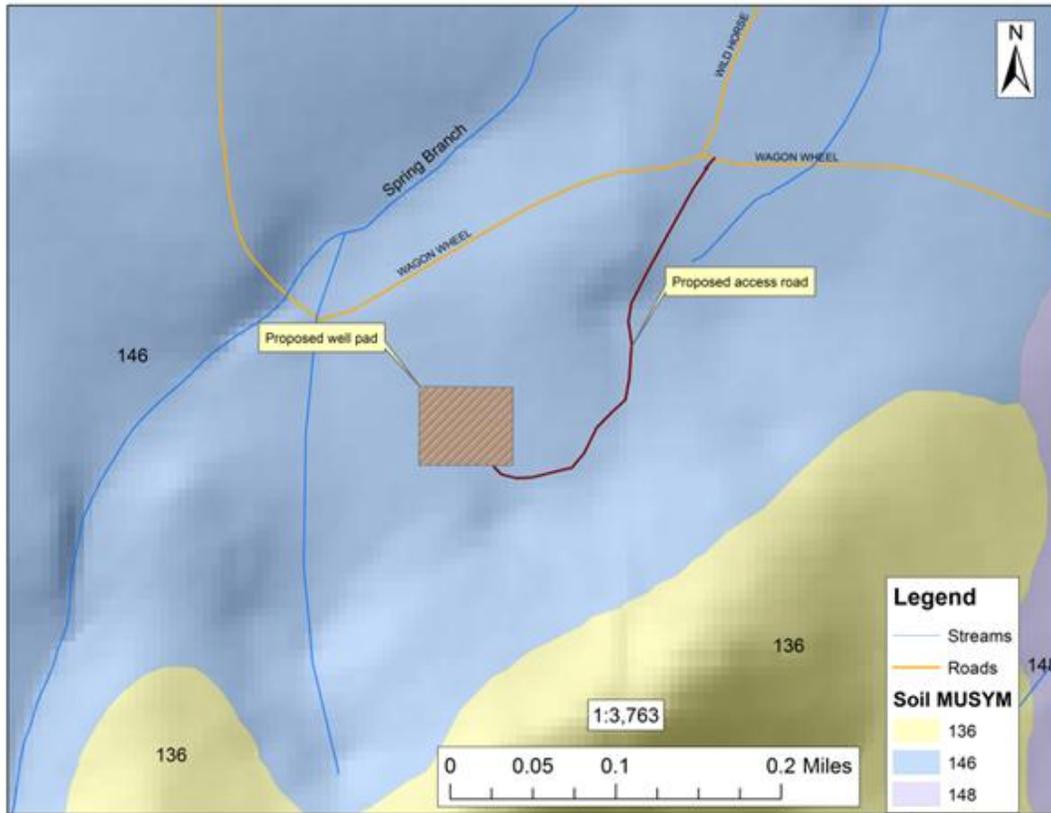


FIGURE 6 – SOIL TYPES WITHIN THE PROJECT AREA (MAP UNIT: 146—GUBEN-LUHON ASSOCIATION, 0 TO 20 PERCENT SLOPES).

Component: Guben (60%)

The Guben component makes up 60 percent of the soil classification map unit (see figure below). Slopes are 0 to 20 percent and the component is on alluvial fans. The parent material consists of alluvium derived from volcanic rock. Typical soil profile includes: Loam (0-8 in), Cobbly loam (8-11 in), Very cobbly loam (11-35 in), and Very gravelly sandy clay loam (35-60 in). This component has moderate fugitive dust resistance rating. Depth to a root restrictive layer is greater than 60 inches. Particle size distribution of sand, silt and clay in the A-horizon is 40, 38, and 22 percent, respectively. The natural drainage class is well drained and water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches and shrink-swell potential are low (Table 6). This soil is neither flooded nor ponded and there is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is within the Limy Bench ecological site. This soil

does not meet criteria for hydric soils . The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Component: Luhon (25%)

The Luhon component makes up 25 percent of the map unit. Slopes are 0 to 15 percent and the component is on alluvial fans. The parent material consists of alluvium derived from soft sedimentary or igneous rocks. Typical soil profile includes: Loam (0-18 in), Gravelly sandy clay loam (18-30 in), and Gravelly sandy loam (30-60 in). This component has moderate fugitive dust resistance rating. Depth to a root restrictive layer is greater than 60 inches. Particle size distribution of sand, silt and clay in the A-horizon is 45, 33, and 22 percent, respectively (Table 6). The natural drainage class is well drained and water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate and shrink-swell potential is low. This soil is neither flooded nor ponded and there is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is within the Limy Bench ecological site. Non-irrigated land capability classification is 6e and irrigated land capability classification is 3e. This soil does not meet criteria for hydric soils. . The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Component: Argicryolls (5%), Loamy-skeletal Luhon (5%), and Pachic Haplocryolls (5%)

These soils are minor components and soils descriptions are not provided.

The major soil components (Guben and Luhon) within the project area have moderate fugitive dust resistance rating (Table 6). This fugitive dust resistance rating interprets the vulnerability of a soil for eroded particles to go into suspension during a windstorm. Fugitive dust could create respiratory and other health problems and cause extreme visibility reductions during severe windstorms.

TABLE 6 - SOIL PROPERTIES FOR SOIL TYPES WITHIN THE PROJECT AREA (MAP UNIT: 146 GUBEN-LUHON ASSOCIATION, 0 TO 20 PERCENT SLOPES)

Map unit symbol	Map unit name	Component name	Erosion hazard (off-road/off-trail)	Erosion hazard (road/trail)	Soil compaction resistance	Soil Restoration Potential	Hydrologic group	Erosion factors		
								Kf	Kw	T
146	Guben-Luhon association	Guben	Slight	Sever	Moderate	High	B	0.28	0.28	3
		Luhon	Slight	Moderate	Moderate	High	B	0.32	0.32	5

Map unit symbol	Map unit name	Component name	Wind erodibility group	Organic matter (%)	Soil texture (%)			Fugitive dust resistance
					Sand	Silt	Clay	
146	Guben-Luhon association	Guben	6	2.0-5.0	40	38	22	Moderate
		Luhon	4L	0.5-1.0	45	33	22	Moderate

Environmental Effects

Proposed Action

Direct and Indirect Impacts:

The proposed action would result in up to 1.2 acres of disturbance due to the access road construction and an additional 2.3 acres of well site disturbance, which results in a total disturbance of approximately 3.5 acres. There could be a moderate to major direct impact to these soils. The proposed development could result in soil compaction, mixing of soil horizons, soil disturbance, loss of topsoil productivity, and an increase susceptibility of the soil to wind and water erosion during initial operations associated with construction and drilling. These impacts could increase surface water runoff, soil erosion, and sediment transport and deposition. A risk of windblown erosion will continue until those disturbed lands are hardened, revegetated, protected by soil stabilizer, or protected by other methods. Increased runoff from the disturbed soils could cause increased erosion and gully down gradient. In addition, soil disturbance could lead to an increase in non-native invasive weed species. Overall, with proper

application and implementation of proposed interim and final reclamation measures and construction standards, offsite and onsite impacts to soils would be minor due to the gentle slopes of the project area and soil productivity would not be considerably altered.

Protective/Mitigation Measures:

The proposed access roads, drill pads, and other infrastructures would be built and reclaimed according to BLM Gold Book (www.blm.gov/bmp/goldbook.htm) standards and other APD Conditions of Approval (COAs). No additional mitigation measures would be required.

No Action Alternative

Direct and Indirect Impacts:

Under this alternative, there would be no new construction. There would be no direct or indirect impact to soils, risk of increased runoff, or risk of increased erosion in the proposed project area.

Protective/Mitigation Measures: Not Applicable.

Finding on the Public Land Health Standard for Upland Soils: Currently, upland soils are meeting Public Land Health Standards. The Proposed Action would cause up to 3.5 acres of soils to no longer meet standards; however with reclamation this would be reduced. With proper application of BLM Gold Book standards and other Conditions of Approval (COAs), there would be no anticipated impacts due to the proposed action.

Cumulative Impacts

The area around the proposed access road and drilling pad has a variety of factors affecting soils including roads, housing, livestock grazing, recreation, off-road vehicle use, and other agricultural activities. Soil disturbance due to the proposed action would have an additional minor soils impact. If economical quantities of oil and gas are found, additional wells could be drilled in the foreseeable future could increase soils disturbance; each additional well development would cause similar minor levels of soil disturbance.

3.2.4 WATER (SURFACE AND GROUNDWATER, FLOODPLAINS)

Affected Environment:

The project area is situated within sixth-level San Francisco Creek watershed (Hydrologic Unit Code HUC-130100020701). Elevation within this watershed ranges from approximately 7,850 feet in the north to over 13,203 feet in the south part of the watershed. The project site is approximately located at elevation ranging between 8,520 and 8,560 feet. Precipitation varies widely with elevation. Lower areas of the watershed receive about 10 inches and higher mountain areas receive about 40 inches of precipitation annually, with most of the rainfall events occurring in July and August. The annual precipitation within the proposed site ranges between 12 and 16 inches. In general, potential evapotranspiration exceeds precipitation on the lowland areas and the reverse is true for the high elevation areas (HRS Water Consultants, Inc. 1987).

San Francisco Creek is a perennial/intermittent stream located within the watershed. The creek is about a mile away from the proposed drilling pad and access road (Figures 7 & 8). West Fork San Francisco Creek, Middle Fork San Francisco Creek and East Fork San Francisco Creek are tributaries to San Francisco Creek. These three tributaries join together to form San Francisco Creek at a location about 3.5 miles upstream from the project area. San Francisco Creek finally subs into the alluvial fan – meaning it no longer shows as surface water – before reaching the Rio Grande. There is one ephemeral drainage (Spring Branch) located west of the proposed project area. Spring Branch drains into San Francisco Creek about 3 miles downstream from the project site. There are several ephemeral drainages within the watershed. Two unnamed small ponds are located within one mile radius of the project site. The first pond, which is perennial, is located about 0.75 miles downstream and the other pond (which is intermittent) is located 0.35 miles upstream of the project area. In addition, there are four perennial lakes located at the headwaters of San Francisco Creek. San Francisco Creek is not on the State of Colorado's listing of impaired streams (Section 303(d), Clean Water Act). There are no floodplains within the proposed project area. Figures 7 and 8 show surface water resources, wells, and springs near the project site at two different scales.

The project area is in the San Luis Valley portion of the Rio Grande Aquifer System. Groundwater occurs in both the unconfined and confined aquifers. The Valley occupies a structural basin bounded by igneous, metamorphic, and sedimentary bedrock. The basin contains valley fill that consists of interbedded deposits of sand, clay, gravel, and some layers of volcanic rocks (Brendle, 2002). The general pattern of groundwater movement in the Valley is inward from the Valley's edges to the center of the valley. There are over

14,000 wells in the San Luis Valley, 2,560 of which are considered small wells. (Davey, 2013).
 The San Luis Valley is highly dependent on groundwater resources.

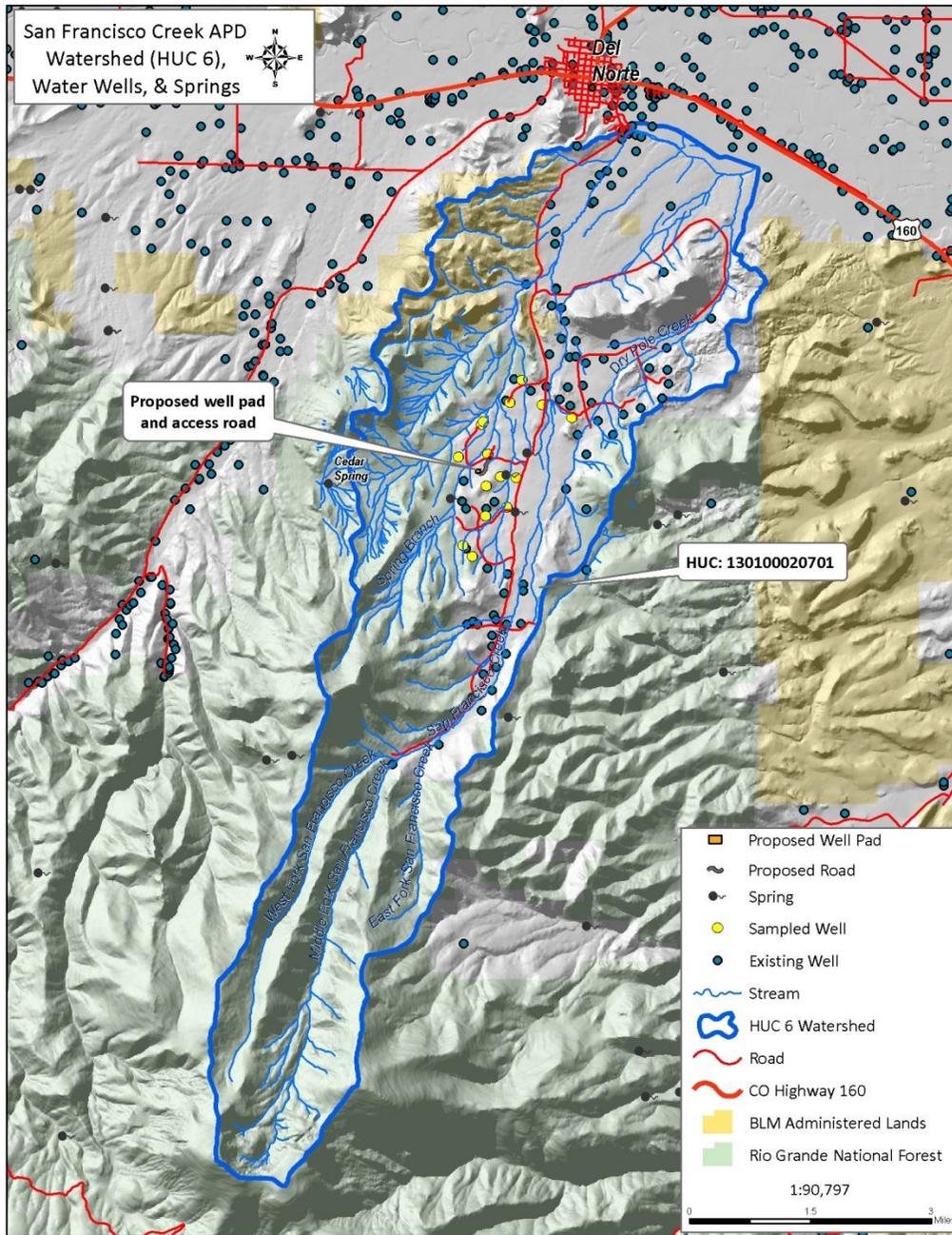


FIGURE 7 – WELLS, SPRINGS, AND STREAMS WITHIN THE SAN FRANCISCO CREEK WATERSHED.

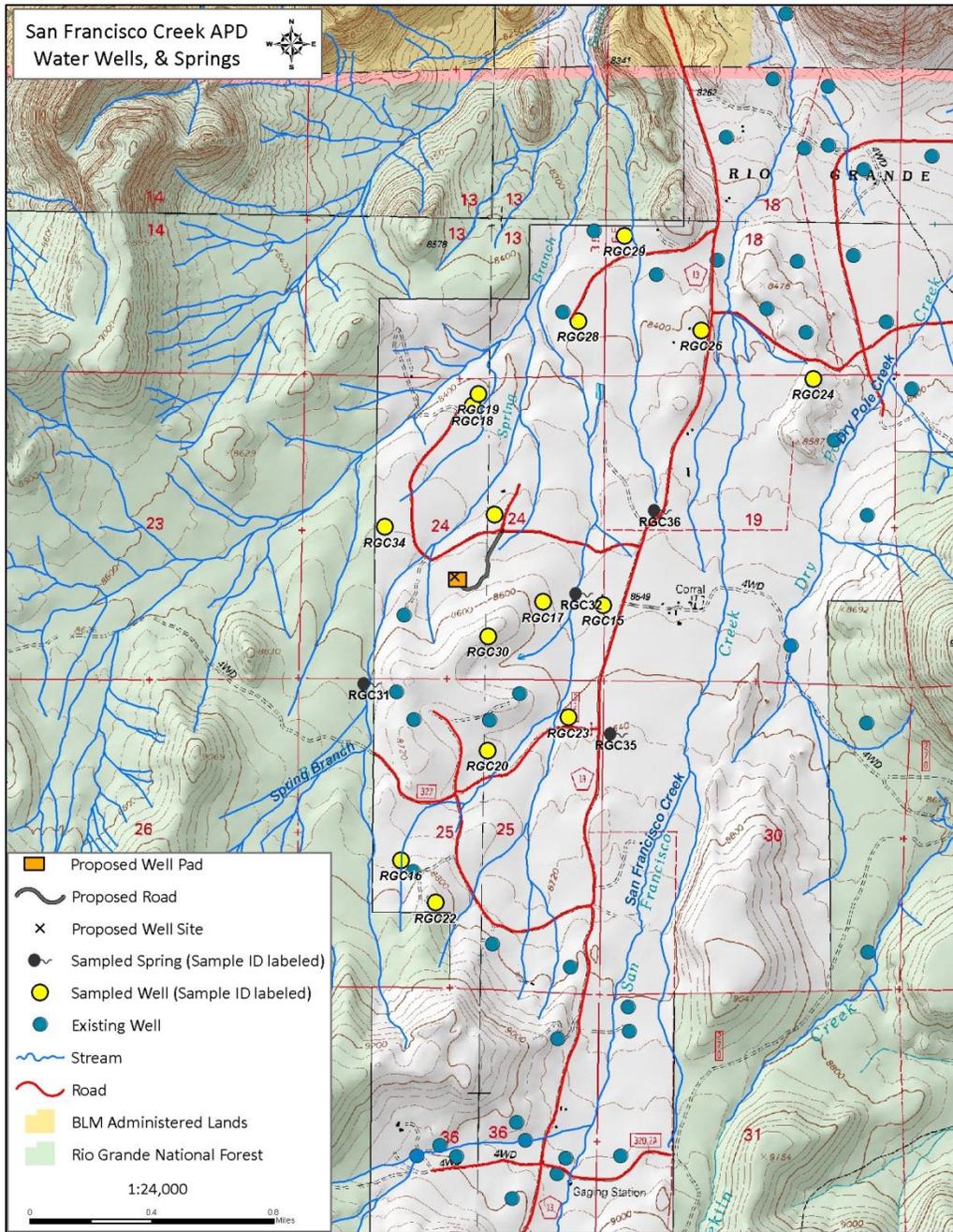


FIGURE 8 – WELLS, SPRINGS, AND STREAMS IN THE PROJECT AREA

Unconfined groundwater occurs nearly everywhere in the San Luis Valley. The unconfined aquifer is recharged by infiltration of irrigation waters, leakage from canals, seepage from mountain streams that flow across permeable alluvial fans, and infiltration from precipitation. This indicates that the drainage in the project area is an unconfined aquifer recharge area. Confined groundwater occurs under nearly one-half of the San Luis Valley. The confined aquifer is recharged from precipitation in the Sangre de Cristo Mountains in the east and San Juan Mountains in the west and enters the aquifer at higher elevations (HRS, 1987). The major discharge from the unconfined aquifer is through pumping wells, seepage to streams, and evapotranspiration. Discharge from the confined aquifer is by pumping wells, springs, and upward leakage through the clay series into the unconfined aquifer. Below the unconfined aquifer are a number of clay-based layers that serve to separate the unconfined aquifer from the deeper layers of sands and gravels containing water in the confined aquifer. The clay layers reduce upward movement of water from the confined aquifer creating water pressure (HRS, 1987). Along the edges of the valley there is little separation between the confined and the unconfined aquifers (CDWR, 1998). Within the project area, which is located along the edge of the valley, there may be little to no separation between the confined and unconfined aquifers. In some parts of the valley, where the confining layer is less thick and has more transmission, water from the confined aquifer leaks upward through the confining layers into the unconfined aquifer (Division 3 Water Administration, 2011). While the general nature of the relationship between the two aquifers and the surface waters is understood, the non-heterogeneous nature of the aquifers in the project area means the local conditions at any one point (e.g., well location) are not well characterized.

Land use in the vicinity of the proposed project area is dominated by agricultural use and low density residential area. The past and present agricultural and domestic practices, such as grazing and well drilling, altered the natural hydrology of the area. There are several wells, ditches, and diversions located within the watershed that pump and divert groundwater and surface water for domestic and agricultural uses. There is one plugged and abandoned oil/gas well, one abandoned well, and 20 permitted water wells located within one mile radius of the proposed well. In addition to groundwater withdrawal from wells for agricultural and domestic uses, environmental changes and losses due to evapotranspiration have also caused long-term water-level declines in the aquifer system.

Well log (seismic-reflection section and drill-cutting) samples from Waggoner-Baldrige No 1-19 San Francisco Creek test well, located near the project area , show that the primary water

bearing formation at the project site is Conejos Formation. Relatively permeable material is predominant in the upper 1,700 feet to 2,000 feet of this formation in the San Juan foothills (HRS, 1987). This shows that the depth of the water producing formation may reach up to 2,000 feet or more. Total dissolved solids (TDS) concentrations for the aquifer range from 141 to 292 mg/L (Mayo et al., 2007). Analytical results of the baseline sampling conducted in 2010 by Dan A. Hughes Company on wells and surface water samples within one mile radius of the project site indicate that TDS concentrations of well-water samples range from 10 to 440 mg/L. Based on the Rio Grande county hydrogeologic study (Davey et al. 2012), TDS concentration in the vicinity of San Francisco Creek area ranges between 130 and 670 mg/L. The BLM's Onshore Order requires operators to isolate freshwater-bearing and other usable water containing 5,000 ppm or less of dissolved solids and other mineral-bearing formations and protect them from contamination.

The analytical results (Dan A. Hughes Company) show that neither Total Extractable Petroleum Hydrocarbons (TEPH) diesel range organics nor Total Volatile Petroleum Hydrocarbons (TVPH) gasoline range organics were detected in any of the well or surface water samples. The Rio Grande county hydrogeologic study (Davey et al., 2012), however, indicated that methane was detected in one of the springs within the San Francisco Creek area at slightly above the Practical Quantitative Limit, that is, the lowest level that can be reliably achieved within the specified limits of precision and accuracy during routine laboratory operating conditions. The detection of methane in this spring, according to this study, is due to biogenic gas generated from decomposition of organic material in the wetland, not from thermogenic gas from petroleum. The static water level depth of wells within one mile radius of the project site ranges between 19.5 feet to 100.5 feet below the ground surface.

Environmental Effects

Proposed Action

Direct and Indirect Impacts:

Potential surface water impacts from the proposed action are mainly associated with the surface disturbance associated with drilling, access road construction, and related infrastructure after well completion. A total of approximately 3.5 acres would be disturbed initially with fewer remaining acres disturbed after interim reclamation. Potential impacts to surface water from the proposed activities are due to removal of vegetation and exposure of mineral soils. Specific impacts would be soil compaction caused by construction activities that

would reduce the soil infiltration rates and hence increase runoff during precipitation events. Downstream effects of the increased runoff may include changes in downstream channel morphology such as bed and bank erosion or deposition. Due to the flat nature of the topography and moderately high infiltration rate of the soil in this area, little to no new impacts to surface water quality would result from the surface disturbance due to drilling of the proposed well and construction of the access road. Additional surface water impacts could result from chemicals, or other fluids, accidentally spilled or leaked during the development process and could result in contamination of both ground and surface waters. Best management practices, such as those contained in Chapter 4 of BLM's Gold book, are included as design features to mitigate this threat.

Due to scarcity of surface water in the area, groundwater is heavily utilized for agricultural and domestic uses. Therefore, protection of this vital and vast groundwater resource is essential. During the drilling process, the proposed well would pass through usable groundwater aquifers. Potential impacts to groundwater resources could occur if appropriate cementing and casing programs are not strictly followed. The impacts could include loss of well integrity, surface spills, or loss of fluids in the drilling and completion process. It is possible for chemical additives used in drilling activities to be introduced into the water producing formations without proper casing and cementing of the well bore. Changes in porosity or other properties of the rock being drilled through can also result in the loss of drilling fluids. In such conditions, drilling fluids, as well as naturally-occurring metals and radioactive material, can be introduced into freshwater holding aquifers unless proper cementing and casing are applied.

Should hydraulic fracturing be used in the process, changes in the physical properties of the hydrocarbon producing formations due to increasing flow of water, gas, and/or oil around the well bore could occur. Hydraulic fracturing could also introduce chemical additives into the hydrocarbon producing formations and affect the mobility of naturally occurring substances in the subsurface, particularly in the hydrocarbon-containing formation. The ability of these substances to reach to groundwater or surface water as a result of hydraulic fracturing activities is a potential concern (USEPA 2011). Potential impact to groundwater could occur if fractures extend beyond the target formation and reach aquifers, or if the casing or cement around a wellbore fails under the pressures exerted during hydraulic fracturing. In addition, hydraulic fracturing requires extensive quantities of water, equipment, and vehicles, which could increase risks of accidental spills or leaks. Surface spills or releases may flow into nearby surface water and infiltrate into the groundwater.

Hydraulic fracturing materials may include water-based fluids and solid materials. Water-based fluids are used to create pressure and propagate the fracture and to carry the proppant into fracture. Proppants are solid materials that are used to keep the fractures open after pressure is reduced in the well. Volumetric composition of hydraulic fracturing fluid is 90 percent water, 9.51 percent proppant (Silica and quartz sand), and the remaining 0.49 percent are chemical additives (USEPA, 2011). USEPA compiled a list of chemicals that were publically known to be used in hydraulic fracturing in 2010 but the list does not represent the entire set of chemical used in hydraulic fracturing actives (USEPA, 2011). Types of chemical additives used in drilling activities may include acids, hydrocarbons, thickening agents, lubricants, and other additives. These additives are not always used in these drilling activities and some are likely to be benign. Concentrations of these additives also vary considerably since different mixtures can be used for different purposes in oil and gas development and even in the same well bore.

Currently, EPA has not made any conclusion about the extent of exposure to these chemicals when used in hydraulic fracturing fluids or found in hydraulic fracturing wastewater, or their potential impacts on drinking water resources (EPA, 2012). Onshore Order #2 requires that the proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones.

Protective/Mitigation Measures:

Well casing along with cement would be extended well beyond the deepest fresh-water zones to insure that drilling and hydraulic fracturing fluids remain within the well bore and protect groundwater and surface water. Vertical and horizontal fractures in the formations may be encountered during drilling that could contribute to interflow and contamination. As a result, all casings that run-through the well should be cemented from bottom to top so that no casing will be exposed directly to the fresh or usable water zone, or to the targeted oil and gas formations. Shallow aquifers would be protected by extending and properly cementing the conductor casing to adequate depths.

Based on the baseline surface water and groundwater quality analytical results, subsequent water quality monitoring should be conducted within the analysis area to take immediate correcting measures and protect the vital water sources.

Proper management practices are required to prevent and/or contain accidental releases of flowback and produced water to drinking water resources. Spills would be cleaned up and disposed of, or reused, to protect human health and the environment.

No Action Alternative

Direct and Indirect Impacts:

If the wells are not drilled, no new impacts to either ground or surface water quality would occur.

Protective/Mitigation Measures: Not Applicable.

Finding of Water Quality Standard (Standard 5): If drilling requirements, Best Management Practices (BMP), mitigation measures in this and other sections of this document, and other APD COA's are properly conducted, a change to surface or ground water quality is not anticipated due to the proposed action and Standard 5 is being achieved.

Cumulative Impacts

The area currently has a high degree of alteration due to agricultural activities, residential construction, roads, wells, ditches, and diversions. However, no producing oil/gas wells are located around the project site. At the watershed scale, the surface disturbance due to access roads and drilling pad would have minor impact on surface water. In the foreseeable future, additional wells could be drilled if economical quantities of oil and gas are found. This could add a large amount of disturbance that would have a larger impact on surface water and groundwater resources in the future. Hydraulic fracturing could be repeated to maintain the flow of hydrocarbons to the well. The short- and long-term effects of repeated pressure treatments on well construction components such as well casing and cementing are not well understood (USEPA 2011).

3.3 BIOLOGICAL RESOURCES

3.3.1 VEGETATION

Affected Environment

The soil type is considered Guben-Luhon Association with 0 to 20 percent slopes. The Guben component makes up 60% of the soil classification while the Luhon component makes up 25% of the soil classification. Both of these soil classifications place the soil in a Limy Bench ecological range site.

Limy Bench range site description: The site is typically on broad benches and fans above lower valley land. It has developed mostly on igneous outwash material, but overlies volcanic bedrock in a few places. Topography is nearly level to moderately rolling, with some areas forming broad plains. Slopes range up to 25%, but are generally less and are not significant to plant growth. Elevation is mostly 7,600 feet to 8,000 feet, however the site extends up to 8,500 feet in a few places (Soil Conservation Service, 1975)

Winterfat (*Krascheninnikovia lanata*) dominates the plant community and gives the site a distinctive appearance. Fourwing saltbush (*Atriplex canescens*) is usually present. Small amounts of Green’s rabbitbrush (*Chrysothamnus viscidiflorus*) and prickly pear (*Oppuntia polyacantha*) are common. There may be scattered plants of fringed sage (*Artemisia frigida*), snakeweed (*Gutierrezia sarothrae*), rubber rabbitbrush (*Ericameria nauseosa*) and yucca (*Yucca glauca*). Grasses are well distributed through the stand and make up nearly half the annual yield. Indian ricegrass (*Achnatherum hymenoides*), bottlebrush squirreltail (*Elymus elymoides*), and blue grama (*Boutelous gracilis*) are usually the main grasses. Western wheatgrass (*Pascopyrum smithii*) is common in places, and Fendler three-awn *Aristida purpurea* var. *longiseta* is usually present. Scarlet globemallow (*Sphaeralcea coccinea*) and other forbs are of minor importance. Approximate ground cover is 25%.

Percentage composition by weight of the principal species for a limy bench site may total as follows (exceeds 100%):

Species	Amount
Winterfat	50%
Indian ricegrass	15%
Squirreltail	15%
Blue grama	15%
Western Wheatgrass	10%
Fourwing saltbush	10%
Fendler’s threeawn	5%
Green’s rabbitbrush	5%
Other	5%

Tree species are not a natural part of the plant community and species most likely to invade are annual forbs such as Russian thistle (*Salsola kali*), sunflower (*Helianthus annuus*) and golden crownbeard (*Verbesina encelioides*). As the ecological condition declines, Indian ricegrass often disappears and other main grasses become scarce. Blue grama holds its position longer than

the other main grasses. Winterfat and fourwing saltbush become weakened and gradually give way to Green's rabbitbrush and rubber rabbitbrush. Blue grama may become prominent in a stage of recovery if winterfat has been severely thinned.

FIGURE 9 –LOCATION OF PROPOSED ACCESS ROAD(LOOKING SOUTH FROM WAGON WHEEL ROAD).



Photo taken on 9/2013, provided by Dean Erhard.

Environmental Effects

Proposed Action

Direct and Indirect Impacts

Under the proposed action there will be 3 ½ acres of vegetation removed for the construction of a well pad and an access road. The well pad and access road would then be reclaimed at a later time using the stored top soil (per the surface use plan of operation).

The proposed action would have a direct affect on approximately 3 1/2 acres of native vegetation with the construction of the well pad and the creation of a new access road. These direct impacts would result in total loss of the present vegetation on the 3 ½ acres. There would be other areas of vegetative disturbance adjacent to the pad site from the erection of portable toilets, foot trail compaction from on-site human usage of the area, erection of a sediment fence in the area of the road and ephemeral drainage, on site storage tanks, , drill rigs and possibly an emergency pit for storing water if needed. The impacts to the site from the removal of the vegetation could have indirect impacts on the soil in increasing the rate of soil erosion from wind and water. An indirect impact resulting from the removal of the vegetation would be the possibility of invasive weed infestations. Reseeding or reclamation of the area once well completion has ended will be done in accordance with the surface plan of operations and will help reduce these impacts to the vegetation.

Researchers have attributed difficulties of grass establishments in semiarid regions primarily to (1) insufficient moisture, (2) high temperatures, (3) high evaporation rates, (4) wind damage to seedlings and (5) slow growth during the seedling stage (Vallentine, 1971).

Reclamation is most effective when the ecology of the site is considered. The previous plant community or potential plant community native to the site should be identified to help determine the plant communities that can exist on the reclaimed site. Revegetation efforts will be hampered and costs increased if the site contains conditions detrimental to revegetation, such as heavy grazing pressure, insufficient salvaged topsoil, erosion, and compacted or contaminated soil. When conditions are not favorable for the establishment of vegetation, such as periods of drought or the lack of sufficient salvaged topsoil, the surface management agency may allow for subsequent reseeding to be delayed until soil moisture conditions become favorable or may require additional cultural techniques such as mulching, fertilizing, irrigating, fencing, or other approved methods (Gold Book, 2007).

Interim reclamation consists of reclaiming portions of the road not needed for vehicle travel. Wherever possible, cut slopes, fill slopes, and borrow ditches should be covered with topsoil and revegetated to restore habitat, forage, scenic resources, and to reduce soil erosion and maintenance costs. At abandonment, roads must be reclaimed by the operator unless the BLM

or surface owner requests that they be left unreclaimed. Final reclamation includes recontouring the road back to the original contour, seeding, controlling noxious weeds, and may also include other techniques to improve reclamation success, such as ripping, scarifying, replacing topsoil, constructing waterbars, pitting, mulching, redistributing woody debris, and barricading. Seeds of native, perennial species or other plant materials specified by the BLM must be used. Mitigation measures are listed below as recommendations in which to follow for successful reclamation of the disturbed site.

Mitigation Measures

- **Seed Mix**: The seed mixture will be formulated on a Pure Live Seed basis with a blend of winterfat, Indian ricegrass and western wheatgrass. Winterfat should make up half of the seed mixture with Indian ricegrass and western wheatgrass making up the other half of the mix in equal proportions. Please see the chart above for limy bench sites and their plant composition. Any other seed mix will need to be approved by the authorized BLM officer. Seed mix will be formulated with only blue tag certified seed being used.
- **Depth of seeding**: This should be stated on the seed mixture label, however, the size of the seed being used is what the depth should be based on. A good rule of thumb, is to plant grass seed no deeper than seven times the seed diameter. Winterfat should be seeded at a shallow depth, preferable about one-sixteenth inch deep – no emergence was obtained below one-half inch.
- **Rate of seeding**: Seeding should be done on the basis of pounds of Pure Live Seed per acre. If broadcasting, the seeding rate should be increased to compensate for uneven distribution of depth of seeding.
 - Western wheatgrass - 6.9 lbs/acre
 - Indian ricegrass – 4.6 lbs/acre
 - Winterfat – 7.9 lbs/acre
 - Although rates of ten to forty seeds per square foot have been used for seedling grass seeds of medium size, seeding rates based on twenty pure lives seeds per square foot have become somewhat standardized in the U.S. for seeding grasses on ordinary upland range sites.
- **Timing of reseeding**: the disturbed area should be reseeded in September or early October and before temperatures become excessively cold.
- **Mulching** the site after seeding will be done with 2 tons/acre of certified weed-free straw and the mulch must be crimped/anchored into the ground by dragging a disk plow over the mulch as a slight angle or passing over the seeded area with tracked machinery. Mulching

should be done just after seeding the area and placed over the reseeded site to a depth of 2 inches.

- After seeding is completed, the operator must furnish copies of seed labels on all seed used for reclamation on the well pad and the access road to the authorized officer.

Monitoring

Reclamation success or failure will be determined by the BLM, however, it is the operator's responsibility to monitor the site, take the necessary steps to ensure reclamation success, and to notify the BLM when they believe success is achieved (Gold Book, 2007).

Success of the seeded area should be evaluated as early as possible but not before the planted seeds have had a full chance to germinate and establish (It is best to judge the seeding success of most native grasses during the second growing season. In the case of a seeded failure, the area should be reseeded again before complete seedbed preparation is again required. Seed stand success will be determined as stated below for seeded foothill range in an Intermountain Region in the 11th to 13th inch precipitation zone:

Excellent – more than 0.75 seedlings per square foot

Good - 0.5 to 0.75 seedlings per square foot

Fair - 0.25 to 0.5 seedlings per square foot

Poor – less than 0.25 seedlings per square foot

In accordance with the fourth edition of the *Gold Book for Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development*; seeding or planting may need to be repeated until revegetation is successful, as determined by the surface management agency (BLM). It will be the responsibility of the applicant to reseed the area if prior seedings are not successful.

Cumulative Impacts

Reasonable and foreseeable cumulative impacts from the proposed action in combination with coordinated actions such as the transporting of fluids or chemicals could result in an accidental chemical spill that could have an impact on vegetation but to what degree it is not known. The construction of an emergency pit in the case of an oil spill would have cumulative impacts on vegetation and possibly soils and water quality if water contamination occurred from chemicals seeping into the ground water. Cumulative impacts from other actions going on simultaneously would be the creation dust from exposed soil surfaces when vegetation is removed from the area. Cumulative impacts from the removal of 3 ½ acres of vegetation to pad site and access road could result in loss of exposed top soil to wind and water erosion, in addition to erosion

that might occur while the topsoil is stockpiled. With the loss of vegetation at the pad site and the developed roadway, there is reasonable and foreseeable cumulative impacts that could result from weed infestations to these disturbed areas.

No Action Alternative

Direct and Indirect Impacts: Under the no action alternative, the APD would be denied to prevent unnecessary and undue degradation therefore, no proposed developments would take place. There would be no direct and indirect impacts to vegetation from the No Action alternative as no proposed developments described in the proposed action would take place.

Mitigation Measures: Not applicable

Cumulative Impacts: There are no reasonable and foreseeable cumulative impacts from the no action alternative.

Finding on the Public Land Health Standard, Vegetation: Currently, vegetation is meeting Public Land Health Standards. The proposed action would cause disturbance to 3 ½ acres of vegetation which would no longer meet the Public Land Health Standard, however, with reclamation this would be reduced and the vegetation would reestablish and recover over time.

3.3.2 INVASIVE PLANTS

Affected Environment

The project area has not been inventoried by BLM for invasive non-native plant species (noxious weeds) due to the split estate and private surface. Based on site visits and site photos, the native plant community appears to be fully intact and with few invasive non-native species present.

Environmental Effects

Proposed Action

Direct and Indirect Impacts

The proposed action includes the use of heavy mechanized equipment to construct the pad site and road way. In addition drilling equipment and support vehicles will be coming to the site. Most invasive species invade new sites and are established due to dirty equipment and vehicles. The dirt, oil, grease, and other contaminants collect seeds and carry them from one

site to the next. Invasive non-native species often do not germinate for a couple of years after the disturbance depending upon the moisture conditions. It is impossible to determine where the equipment will come from, if invasive species are present, and if the travel route includes driving in, near, or through invasive species infestations. There are many sites containing invasive species and equipment is often stored in areas where invasive species become established and are not treated. There is a likelihood of invasive non-native plant species establishment any time heavy equipment is used and the vegetation is removed from the soil.

Protective/Mitigation Measures:

All equipment and vehicles will be high pressure washed before arriving at the construction site. The pressure washing and inspections removing dirt and other contaminants helps prevent the spread of these species. Top soil will be stock piled and protected from wind and water erosion. Topsoil will be evenly distributed during reclamation to provide a good soil base for reseeding. Only certified weed-free straw or hay will be used on the project site. Following drilling operations, the operator will inventory the site for noxious weeds and a noxious weed treatment plan prepared and implemented.

No Action Alternative

Direct and Indirect Impacts:

This alternative would not change the presence or absence of non-native invasive plant species. There would not be any affects and the need for reclamation would be unnecessary.

3.3.2 THREATENED, ENDANGERED AND SENSITIVE SPECIES

Affected Environment:

Thirty-seven species of threatened, endangered, candidate, or sensitive (TES) wildlife, fish, and plants may occur and are listed in the San Luis Valley BLM, and its associated counties (USDI BLM Colorado, 2009; USDA FS Rio Grande National Forest and USDI BLM San Luis Valley Field Office, 2013) (Table 1). Fifteen species are carried forward for this analysis based on presence within or adjacent to the project area, life history information, or the presence of suitable/potential habitat within or adjacent to the project area. These species include the Gunnison prairie dog, Northern leopard frog, milk snake, bald eagle, ferruginous hawk, peregrine falcon, mountain plover, burrowing owl, Brewer's sparrow, fringed myotis, big free-tailed bat, Townsend's big-eared bat, Rio Grande cutthroat trout, Rio Grande sucker and Rio Grande chub.

The project area is situated within sixth-level San Francisco Creek watershed (Hydrologic Unit Code: 130100020701), which encompasses 21,582 acres (see Figure 7, pg. 37). For the purpose of evaluating potential direct and indirect effects of the alternatives on TES species, the 6th level watershed boundary will be used as the analysis area. This area was selected as it is a well-defined boundary that provides habitat for all 15 species addressed, and is a reasonable size for addressing effects while accounting for movements and habitat use by these species beyond the immediate project area.

Elevation within this watershed ranges from approximately 7,850 feet in the north to over 13,203 feet in the south part of the watershed. The elevation at the project site ranges from 8,520 to 8,560 feet. Habitat within and adjacent to the project area is categorized as Southern Rocky Mountain Montane-Subalpine Grassland vegetation (RS/ GIS Laboratory, College Of Natural Resources, 2004). At the project site the plant community is mostly composed of Green's rabbitbrush (*Chrysothamnus Greenei*), winterfat (*Krascheninnikovia lanata*), blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), bottlebrush squirreltail (*Elymus elynoides*), and minor amounts of fourwing saltbush (*Atriplex canescens*), pricklypear cactus (*Opuntia polyacantha*), and soapweed yucca (*Yucca glauca*).

Water bodies within the project area include San Francisco Creek, one intermittent stream, an ephemeral drainage (Spring Branch), Cedar Spring, and two unnamed ponds.

The proposed action would occur on privately owned surface lands within a small subdivision community, with homes developed on 35-acre lots. Subdivision development including home construction, road and driveway construction, fences, increased human and pet presence, lights and noise associated with the subdivision has occurred. This development has likely increased habitat fragmentation and reduced the overall quality of habitat available for species in this area, particularly for species more sensitive to disturbance (Knight et al, 1995, McClure et. al, 2013).

Environmental Effects:

Direct and Indirect Impacts:

The proposed action would occur on privately owned surface lands within an existing subdivision. Potential impacts from this project include effects caused by construction of an access road approximately 1,320 feet in length with a 40 foot wide ground disturbance during construction, 14 foot wide completed road surface, and construction of a drilling pad

approximately 2.3 acres in size. While the physical loss of habitat from these features is relatively small (approximately 3.5 acres), the added disturbance caused by increased human presence and equipment (and associated noise, etc.) may result in a larger disturbance footprint than the construction footprint alone. These indirect impacts would occur during construction and exploratory drilling phases, expected to take approximately 45 days.

TABLE 7 - DIRECT, INDIRECT, AND CUMULATIVE EFFECTS/IMPACTS ON THREATENED, ENDANGERED, CANDIDATE, AND SENSITIVE SPECIES ASSOCIATED WITH THE PROPOSED PROJECT

Species	Status	Species Occurrence	Habitat Requirements	Effects Determination: Proposed Action	Effects Determination: No Action
Federally Listed Species					
Black-footed Ferret	FE	No habitat present, no known occurrence	Needs prairie dog town or complexes of >200 acres.	None	None
Canada Lynx	FT	No habitat present; no known occurrence	High elevation, mixed conifer forests	None	None
Southwestern Willow Flycatcher	FE	No habitat present; no known occurrence	Riparian areas with dense willow and understory	None	None
Mexican Spotted Owl	FE	No habitat present; no known occurrence.	Steep canyon habitats	None	None
North American Wolverine	Proposed FT	No habitat present; no known occurrence.	Boreal forest, subarctic, and alpine tundra	None	None
New Mexico meadow jumping mouse	Proposed FE	No habitat present; no known occurrence.	Primarily associated with tall grass and sedge wetland components in riparian areas along perennial streams; elevation limit suspected to be	None	None

			below 8000 feet.		
Gunnison's Sage-grouse	Proposed FE	No habitat present; no known occurrence.	Sagebrush grasslands	None	None
Yellow-billed cuckoo	Proposed FT	No habitat present; no known occurrence.	Riparian/ cottonwood galleries with dense understory.	None	None
Uncompahgre fritillary butterfly	FE	No habitat present; no known occurrence	Inhabits Alpine above 12,000 feet with large patches of snow willow	None	None
BLM Sensitive Species					
Amphibians and Reptiles					
Northern Leopard Frog	SS, SC	Suitable habitat nearby; no known occurrence	Near permanent water with rooted veg., can travel far during wet periods	MI	NI
Milk Snake	SS, SC	Habitat present; no known occurrence	Generally below 8,000 feet, grassland and shrubland habitats	MI	NI
Birds					
American White Pelican	SS	No habitat present; no known occurrence	Rivers, lakes, reservoirs, and open marshes	None	None
Bald Eagle	SS, ST	Habitat present; no known occurrence	Winter roosting along stream corridors in large open canopy trees	MI	NI
White-faced Ibis	SS	No habitat present ; no known occurrence	Freshwater marshes, swamps, ponds, and rivers	None	None
Northern Goshawk	SS	No habitat present; no known occurrence	Deciduous, coniferous, and mixed forests; generally occurs in	None	None

			remote, undisturbed habitats		
Ferruginous Hawk	SS, SC	Suitable habitat present; no known occurrence	Open country, sagebrush, semi-desert shrubland, and the periphery of woodlands.	MI	NI
Peregrine Falcon	SS, SC	Suitable habitat present; no known occurrence	Open habitats, especially where there are nearby nesting cliffs, as well as open forested areas	MI	NI
Mountain Plover	SS, SC	Habitat present; no known occurrence	Flat, sparsely vegetated semi-desert shrublands	MI	NI
Western Snowy Plover	SS, SC	No habitat present; no known occurrence	Alkali flats around reservoirs, migrants occur on mudflats and sandy shorelines	None	None
Burrowing Owl	SS, ST	Habitat present; no known occurrence	Open areas, found near prairie dog towns within shrub-steppe habitat	MI	NI
Black Swift	SS	No habitat present; no known occurrence	Habitats near waterfalls and wet cliffs	None	None
Brewer's sparrow	SS	Habitat present; no known occurrence	Sagebrush or other shrublands/grasslands; also within larger pinyon-juniper openings	MI	NI
Insects					
Great basin Silverspot Butterfly	SS	No habitat present; no known occurrence	Riparian with bog violets; mostly tied to springs and bogs at low elevation (7,500 ft. or below) (Ellis, 2012)	None	None
Mammals					

Big Free-tailed Bat	SS	Habitat present; no known occurrence	Lower elevations in rocky canyon country, where it roosts in crevices	MI	NI
Gunnison Prairie Dog	SS	Suitable habitat present; known occurrence	Short to mid-grass prairies or shrublands, with deep, well drained soils and relatively flat slopes	MI	NI
Fringed Myotis	SS	Habitat present; no known occurrence	Pinyon-juniper and other coniferous woodlands	MI	NI
North American Wolverine	SS	No habitat present; no known occurrence	Boreal forest, subarctic, and alpine tundra	None	None
Townsend's Big-eared Bat	SS, SC	Habitat present; no known occurrence	Shrublands, pinyon-juniper woodlands, and open montane forests; highly associated with caves and mines	MI	NI
Swift Fox	SS	Habitat potentially present; no known occurrence	Grasslands and short-grass prairie, ecotones with P-J/shrublands. Recently discovered in the SE portion of the SLV, but have not been recorded anywhere else within SLV.	None	None
Fish					
Rio Grande sucker	SS, SE	Habitat nearby, known occurrence within 1 mile	Clear, cool-water stream habitats	MI	NI
Rio Grande Chub	SS, SC	Suitable habitat within 1 mile; no known occurrence	Clear, cool-water stream habitats	MI	NI
Rio Grande Cutthroat Trout	SS, SC	Habitat nearby, known occurrence within 1 mile	Clear, cool-water stream habitats with rocky substrates	MI	NI
Plants					

Fragile Rockbrake	SS	No habitat present; no known occurrence	Horizontal crevices of moist, shaded limestone cliffs, which tend to be mossy, and are often associated with waterfalls and under shallow rock overhangs. Elev.7825-13,458	None	None
Pale blue-eyed grass	SS	No habitat present; no known occurrence	Margins of streams, wet meadows and fens. Elev. 7900-9500 ft. limited occurrences in Saguache County	None	None
Ripley's Milkvetch	SS	No habitat present; no known occurrence	On volcanic substrates in open-canopy ponderosa pine-Arizona fescue savannah, or along the edges of mixed coniferous woodlands where Festuca arizonica is dominant. Elev. 8200-9300 ft.	None	None
Rock loving neoparrya	SS	No habitat present; no known occurrence	Igneous outcrops or sedimentary rock derived from extrusive volcanics. North facing cliffs and ledges, within pinyon-juniper woodlands. Elev. 7000-10,000 ft.	None	None
Slender spiderflower	SS	No habitat present; no known occurrence	Saline or alkaline soils; around ponds, meadows, or old lake beds. Often grows in bands just above rushes and extending into greasewood and saltgrass. Elev.	None	None

			7500-8000 ft.		
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Environmental Effects

Proposed Action

Direct and Indirect Impacts:

During construction and exploratory drilling operations, TES species in the area would be exposed to higher levels of vehicular traffic (increasing the risk of vehicular collisions) and heavy equipment operations. TES species could be injured or killed during access road and well pad construction, and other activities. Small or less mobile animals such as reptiles, amphibians, and rodents would be most susceptible to direct injury or mortality from well pad development activities and increased vehicular traffic. Other direct effects could include TES birds or bats being burned or killed by exhaust vents, heater-treaters, flare stacks, or other equipment used during drilling, if openings are used as a perch or roost site while in operation.

TES species habitat directly affected by this project includes 3.5 acres of habitat loss through road construction (1.2 acres) and well pad construction (2.3 acres). Within this 6th level HUC, approximately 7,912 acres of Southern Rocky Mountain Montane-Subalpine Grassland vegetation occurs (RS/ GIS Laboratory, College Of Natural Resources, 2004). The direct impact from this project would result in the loss of approximately 0.04% of this habitat within this HUC.

However, because of the added disturbance caused by increased human presence and equipment (and associated noise, etc.), a larger “disturbance footprint” than the construction footprint alone, would result. Increased stress associated with noise may cause disruption of breeding, migration, wintering, foraging, and other behavioral activities. Low-level noise from operation of the well could have long-term effects on wildlife species, causing them to avoid the area, or potentially putting chronic stress on animals, affecting their energy budget, reproduction, and long term survival (Radle, 2007).

Acoustical cues play a dominant role in sexual communication, territory defense, habitat quality assessment, and predator-prey interactions (Barber et a., 2009), and may be impacted by low-level noise. For example, noise could interfere with bats that use echolocation to detect prey species. Studies have documented substantial changes in foraging and anti-predator behavior,

reproductive success, density, and community structure in response to noise (Kight and Swaddle, 2011). Because reproductive success and nutritional condition can decrease due to increased energy expenditures resulting from physical response to disturbance, it is important to minimize these effects through the implementation of mitigation measures/stipulations, which require restricting disturbance during the period when animals are most stressed.

In addition, it is possible that displaced animals will not return to these affected areas, potentially resulting in loss of habitat. Sawyer et al. (2006; 2009) observed displacement of mule deer from areas undergoing energy development with no indication of re-occupancy of abandoned areas.

The highest noise levels would likely occur during drilling and gas flaring (Tribal Energy and Environmental Information Clearinghouse, 2013). Noise from drilling has been measured at 115 dBA at well sites, comparable to drilling for other activities (i.e., geothermal development), and is consistent with noise levels generated from other industrial activities (U.S. Dept. of Energy, 2006; Tribal Energy and Environmental Information Clearinghouse, 2013). Sound levels above 50 dB are considered potentially deleterious to wildlife (Reijnen et al, 1997). It is difficult to calculate noise attenuation across a non-uniform environment, but utilizing the Inverse Square Law (Nave, 2005) suggests the 50 db noise level from the well pad would be achieved approximately 1.1 miles from the well site. Because topography and other conditions dampen sound, for purposes of this analysis we used a 1 mile “disturbance footprint” around the well site, increasing the affected acres from 3.5 to 2010 acres. Taking the larger “disturbance footprint” into account, the project could impact 25% of the Southern Rocky Mountain Montane-Subalpine Grassland habitat available within the watershed during these operations (2010 acres impacted out of 7,912 acres available). This “disturbance footprint” would likely be avoided by many species, depending on their sensitivity to noise and human activity, and whether they have previously habituated to some amount of human activity that is present in the subdivision. These indirect effects due to noise from drilling, construction, increased truck traffic and increased human activity at the site is expected to last 45 days, with some of the disturbance potentially occurring 24 hours per day.

Soil compaction and damage to vegetation in the area from construction activities can increase erosion on the site and the potential expansion of noxious weeds in these disturbed areas will reduce the quality and quantity of available habitat. The spread of noxious weeds makes it more difficult for native species to reestablish in disturbed areas, threatening the continued existence of native species on the site. This can affect wildlife by reducing habitat quality and

species diversity, thereby affecting foraging and breeding behavior. Increased erosion caused by site clearing, grading, access roads construction, containment basins, site runoff, and vehicle and human foot traffic can also degrade aquatic habitats. The effects of erosion include increased turbidity or sedimentation of aquatic habitats, which can directly affect fish, amphibians and other aquatic biota.

Additional impacts to water quality could result from chemicals or other fluids being accidentally spilled or leaked during the development process or during transport to the site that could result in the contamination of both ground and surface waters. Although the site is currently dry, intermittent and ephemeral channels lie within approximately 700 feet and 450 feet, respectively of the proposed well site. In wetter conditions, a spill could contaminate these channels, as shown by the flow path from the well site, modelled with a LiDar elevation model. (See Figure 10, page 65). In addition, the haul route crosses intermittent and ephemeral channels at least 8 times (See Figure 11, page 66). Should a spill occur during transport to or from the site, it is possible to contaminate aquatic systems. Mortality of individuals could occur if the spill was large enough and not contained immediately. Best management practices would be contained in the condition of approval that would detail a spill response plan adequate to mitigate this threat.

Groundwater is connected to important surface water habitats (perennial and ephemeral stream channels, ponds and springs) that species rely on. Although the exact interactions between surface and groundwater may not be fully understood, it is possible that effects to groundwater in this area would impact the wildlife resource. Therefore, protection of groundwater is essential. For a more detailed discussion of potential effects to groundwater and surface water, see section 3.2.4.

Because the surrounding area will still provide relatively intact, important wildlife habitat, and because the project is only projected to last 45 days, the effects of this potential loss of habitat can be minimized with the implementation of mitigation measures, including timing limitations, BMPs, and other protective measures identified in the drilling plan and COAs. Therefore, population-level effects on species are considered to be minimal.

Cumulative Impacts

The Proposed Action, while limited in size and duration and therefore somewhat limited in terms of its local impact on TES species, adds to the cumulative effect of habitat loss and decreased habitat quality that is occurring in this general area for TES species. Issues affecting

available habitat in the San Luis Valley include agricultural developments, housing developments, impacts from several years of intense drought conditions, fire suppression, and recreation activities all resulting in overall habitat loss or reduction in habitat quality and increased stress on TES species. Activities potentially affecting TES species in the project area include habitat fragmentation from subdivision development including home construction, road and driveway construction, fences, increased human and pet presence, grazing and decreased forage and water levels due to drought. With the implementation of the proposed mitigation measures, operational requirements, and BMPs, it is anticipated that environmental consequences of displacement of TES species and loss of habitat would affect some individuals but is not likely to cause a trend towards Federal listing, as effects are localized in nature.

Mitigation Measures

- Construct, modify and maintain all open-vent exhaust stacks to prevent birds and bats from entering, and to discourage perching, roosting and nesting (required by the Migratory Bird Memorandum of Understanding between BLM and USFWS, and required by Executive Order 13186 for the protection of Migratory bird species).
- Conduct raptor nest surveys within a 0.5 mile radius of the project site, prior to any ground disturbing activities to protect any existing raptor nest sites, and to be in compliance with the Migratory Bird Treaty ACT (MBTA) and the Memorandum of Understanding between BLM and USFWS required by Executive Order 13186.
- If any raptor nests are located, apply appropriate timing limitation.
- If prairie dogs are present within the project area, the operator should incorporate special modifications to facility siting, design, construction, and operation to minimize involvement of prairie dog burrow systems (Colorado State Stipulation for Prairie dog).
- If prairie dogs are present at the site, abide by special daily and seasonal activity restrictions on construction, drilling, product transport, and service activities during Gunnison prairie dog reproductive period (March 1 – June 15; Colorado State stipulation for prairie dog).
- Provide in-kind compensation for habitat loss and/or displacement of Gunnison prairie dog (e.g., special on-site PD habitat enhancement) when appropriate (Colorado State Stipulation for Prairie dog).
- Conduct winter eagle roost survey. No surface use is allowed within 0.5 miles of an active winter roost site between November 15 and March 15 (Colorado State Stipulation for Bald eagle).

No Action Alternative:

Direct and Indirect Impacts: Under the No Action Alternative, the proposed project would be denied and there would be no additional impacts to TES species.

Cumulative Impacts: As there would be no direct or indirect effects under this alternative, there would be no additional cumulative effects from this project.

Finding on the Public Land Health Standard for Special status, threatened and endangered species: Overall, the project area is generally meeting the land health standards for TES species; however, this project adds incrementally to longer term and larger-scale habitat concerns and increases the amount of disturbance that reduces the utility of adjoining habitats. However, due to the localized effects and limited duration of this project, it is not expected to compromise continued landscape level maintenance of the standard.

3.3.3 WILDLIFE AQUATIC

Affected Environment:

The project area is situated within sixth-level San Francisco Creek watershed (HUC: 130100020701). Elevation within this watershed ranges from approximately 7,850 feet in the north to over 13,203 feet in the southern part of the watershed. The project site is located at an elevation ranging between 8,520 and 8,560 feet. The amount of precipitation within the proposed site ranges between 12 and 16 inches.

San Francisco Creek, and its tributaries Middle Fork and West Fork are the only perennial streams located within the watershed. There are a total of 17.8 miles of perennial streams, 87.4 miles of intermittent streams and 51.8 miles of ephemeral stream channels within the watershed. San Francisco Creek lies 0.88 miles east of the proposed drilling pad and access road. There is one intermittent stream channel that lies 648 feet from the proposed site, and an ephemeral drainage (Spring Branch) that lies 470 feet of the proposed well site. This stream drains into San Francisco Creek about 3 miles downstream from the project site. Within 1 mile of the proposed well site, there are 18.5 miles of stream channel. San Francisco Creek subs into the alluvial fan before reaching the Rio Grande. Two unnamed small ponds are located within a one mile radius of the project site. The first pond, which is perennial, is located about 0.75 miles downstream and the other pond (which is intermittent) is located 0.35 miles upstream of the proposed drilling pad. Cedar Spring is located 1.8 miles from the project site.

The Project Area is in the San Luis Valley portion of the Rio Grande Aquifer System (see section 3.3.2 for complete description). As described in the Water Quality section, there is a

connection between the groundwater aquifers and surface waters, although it may not be well understood. Aquatic wildlife near the project area includes amphibians and fish utilizing both perennial habitats as well as intermittent and ephemeral habitats when they are wet. Amphibians using nearby stream and pond habitats could include tiger salamanders, chorus frogs, and northern leopard frogs (BLM sensitive species). Fish species of concern that occur in San Francisco Creek include Rio Grande sucker (state endangered and BLM sensitive species) and Rio Grande cutthroat trout (candidate for Federal listing as threatened or endangered and BLM sensitive species). Suitable habitat for Rio Grande chub (State Species of Concern and BLM sensitive species) also occurs in San Francisco Creek.

Environmental Effects

Direct and Indirect Impacts:

Potential surface water impacts from the proposed project are associated with surface disturbance from well pad construction (2.3 acres) and access road construction (1.2 acres), totaling 3.5 acres disturbed. Most impacts to surface water from the proposed activities would be due to removal of vegetation and exposure of mineral soils. Specific impacts would be soil compaction caused by construction activities that would reduce the soil infiltration rates and hence increase runoff during precipitation events. Downstream effects of the increased runoff may include changes in downstream channel morphology such as bed and bank erosion or deposition. This could negatively affect surface water quality or cause increased turbidity and sedimentation of aquatic habitats. Fish and amphibians are highly sensitive to changes in water quality, and sedimentation can cause a variety of detrimental effects including egg suffocation, decreased macroinvertebrate production affecting food resource availability, etc. However, these effects are expected to be minimal, given the small size of the disturbed area, the relatively flat nature of the topography and moderately high infiltration rate of the soil in this area.

Additional impacts to water quality could result from chemicals or other fluids being accidentally spilled or leaked during the development process or during transport to the site that could result in the contamination of both ground and surface waters. Although the site is currently dry, intermittent and ephemeral channels lie within approximately 700 feet and 450 feet, respectively of the proposed well site. In wetter conditions, a spill could contaminate these channels, as shown by the flow path from the well site, modelled with a LiDar elevation

model (see Figure 10). In addition, the haul route crosses intermittent and ephemeral channels at least 8 times (see Figure 11).

FIGURE 10 – WATER FLOW PATH FROM PROPOSED WELL SITE

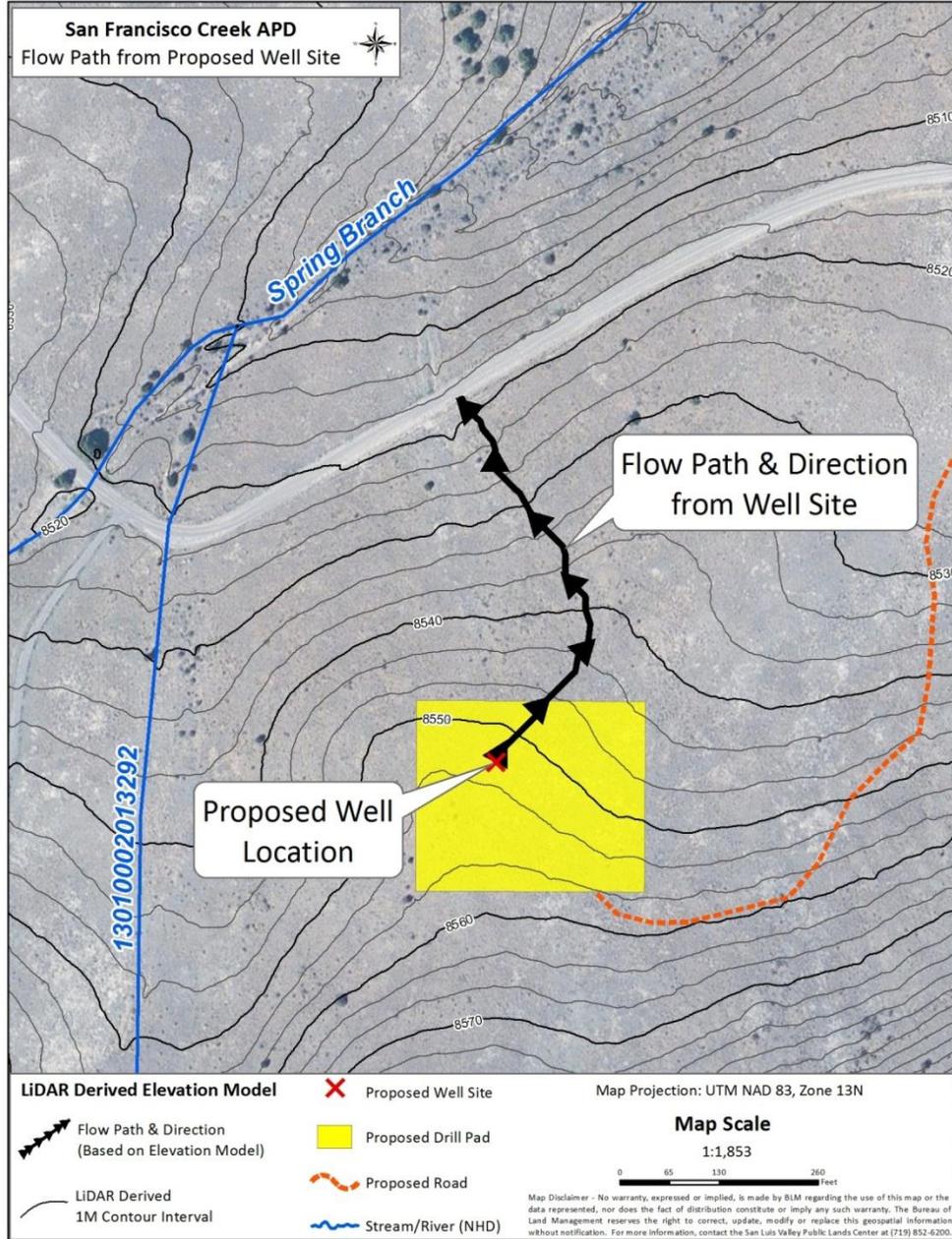
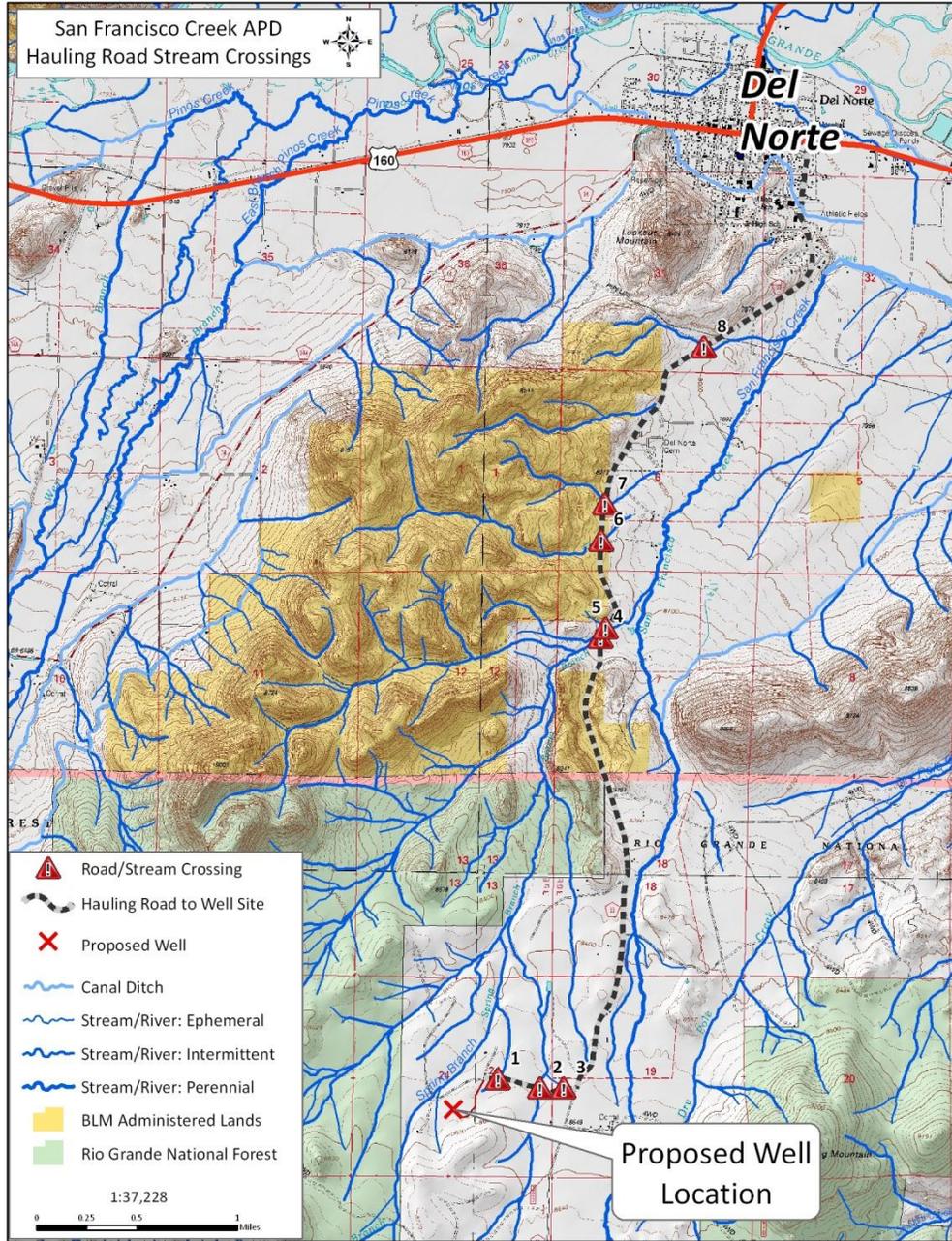


FIGURE 11 – HAULING ROAD STREAM CROSSINGS



Should a spill occur during transport to or from the site, it is possible to contaminate aquatic systems. Mortality of individuals could occur if the spill was large enough and not contained

immediately. Best management practices would be contained in the condition of approval that would detail a spill response plan adequate to mitigate this threat.

Groundwater is connected to important surface water habitats (perennial and ephemeral stream channels, ponds and springs) that species rely on. Although the exact interactions between surface and groundwater may not be fully understood, it is possible that effects to groundwater in this area would impact the aquatic wildlife resource. Therefore, protection of groundwater is essential. For a more detailed discussion of potential effects to groundwater and surface water, see section 3.2.4.

Because surface disturbance will be limited to 3.5 acres and because the project is only projected to last 45 days, the effects of this project can be minimized with the implementation of mitigation measures, BMPs, and other protective measures identified in the drilling plan and COAs. Therefore, population-level effects on species are considered to be minimal.

Mitigation Measures:

- Conduct baseline surface water and groundwater quality surveys and conduct periodic water quality monitoring during project implementation, to allow immediate corrective measures to be implemented, if necessary, to protect vital water sources.

Cumulative Effects

The Proposed Action, while impacting a relatively small area (3.5 acres), adds to the cumulative effect of alterations in the area including agricultural activities, residential construction, roads, wells, ditches, and diversions. Additional cumulative impacts to aquatic wildlife include impacts from several years of intense drought conditions. However, with the implementation of the proposed mitigation measures, operational requirements, and BMPs, it is anticipated that environmental consequences to aquatic wildlife would potentially affect some individuals but is not likely to cause a trend towards Federal listing.

No Action Alternative:

Direct and Indirect Effects: Under the No Action Alternative, the proposed project would be denied and there would be no impacts to aquatic wildlife species.

Cumulative Effects: As there would be no direct or indirect effects under this alternative, there would therefore be no cumulative effects.

Finding on the Public Land Health Standard for plant and animal communities: Overall, the project area is generally meeting the land health standards for aquatic wildlife communities; however, this project adds incrementally to longer term and larger-scale habitat concerns. This project is not expected to compromise continued landscape level maintenance of the standard.

3.3.4 WILDLIFE TERRESTRIAL

Affected Environment:

The project area is situated within sixth-level San Francisco Creek watershed (Hydrologic Unit Code: 130100020701), which encompasses 21,582 acres (see Figure 7, Surface Water Resources Within the Watershed, pg. 37). For the purpose of evaluating potential direct and indirect effects of the alternatives on wildlife species, the 6th level watershed boundary will be used as the analysis area. This area was selected as it is a well-defined boundary that provides habitat for many species of wildlife, and is a reasonable size for addressing effects while accounting for movements and habitat use by these species beyond the immediate project area.

Elevation within this watershed ranges from approximately 7,850 feet in the north to over 13,203 feet in the south part of the watershed. The elevation at the project site ranges between approximately 8,520 and 8,560 feet. Habitat within and adjacent to the project area is categorized as Southern Rocky Mountain Montane-Subalpine Grassland vegetation (RS/ GIS Laboratory, College Of Natural Resources, 2004), which at the project site is mostly composed of Green's rabbitbrush (*Chrysothamnus Greenei*), winterfat (*Krascheninnikovia lanata*), blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), bottlebrush squirreltail (*Elymus elynoides*), and minor amounts of fourwing saltbush (*Atriplex canescens*), pricklypear cactus (*Opuntia polyacantha*), and soapweed yucca (*Yucca glauca*).

The proposed action would occur on privately owned surface lands within a small subdivision community, with homes developed on 35-acre lots. Subdivision development including home construction, road and driveway construction, fences, increased human and pet presence, lights and noise associated with the subdivision has occurred. This development has likely increased habitat fragmentation and reduced the overall quality of habitat available for species in this area, particularly for species more sensitive to disturbance (Knight et al., 1995; McClure et. al, 2013).

Wildlife species utilizing this area include pronghorn antelope, mule deer, elk, Gunnison's prairie dog, various rodents and a variety of birds, including raptors such as red-tailed hawk and golden eagles. The project area, as mapped by Colorado Parks and Wildlife, is within the mule deer overall, winter, severe winter and winter concentration areas; elk overall, winter, severe

winter and winter concentration areas; pronghorn overall range; bald eagle winter range; black bear overall range, and mountain lion overall range. Although no raptor nests were found on the site, raptors were seen foraging in the general vicinity (Western Land Services, Inc, 2012).

Environmental Effects

Proposed Action

Direct and Indirect Impacts:

During construction and exploratory drilling operations, wildlife species in the area would be exposed to higher levels of vehicular traffic (increasing the risk of vehicular collisions) and heavy equipment operations. Wildlife species could be injured or killed during access road and well pad construction, and other activities. Small or less mobile animals such as reptiles, amphibians, and rodents would be most susceptible to direct injury or mortality from well pad development activities and increased vehicular traffic. Other direct effects could include birds or bats being burned or killed by exhaust vents, heater-treaters, flare stacks, or other equipment used during drilling, if openings are used as a perch or roost site while in operation.

Wildlife habitat directly affected by this project includes 3.5 acres of habitat loss through road construction (1.2 acres) and well pad construction (2.3 acres). Within this 6th level HUC, approximately 7,912 acres of Southern Rocky Mountain Montane-Subalpine Grassland vegetation occurs (RS/ GIS Laboratory, College Of Natural Resources, 2004). The direct impact from this project would result in the loss of approximately 0.04% of this habitat within this HUC.

However, because of the added disturbance caused by increased human presence and equipment (and associated noise, etc.), a larger “disturbance footprint” than the construction footprint alone, would result. Increased stress associated with noise may cause disruption of breeding, migration, wintering, foraging, and other behavioral activities. Low-level noise from operation of the well could have long-term effects on wildlife species, causing them to avoid the area, or potentially putting chronic stress on animals, affecting their energy budget, reproduction, and long term survival (Radle, 2007).

Acoustical cues play a dominant role in sexual communication, territory defense, habitat quality assessment, and predator-prey interactions (Barber et al., 2009), and may be impacted by low-level noise. For example, noise could interfere with bats that use echolocation to detect prey species. Studies have documented substantial changes in foraging and anti-predator behavior, reproductive success, density, and community structure in response to noise (Kight & Swaddle,

2011). Because reproductive success and nutritional condition can decrease due to increased energy expenditures resulting from physical response to disturbance, it is important to minimize these effects through the implementation of mitigation measures/stipulations, which require restricting disturbance during the period when animals are most stressed.

In addition, it is possible that displaced animals will not return to these affected areas, potentially resulting in loss of habitat. Sawyer et al. (2009; 2006) observed displacement of mule deer from areas undergoing energy development with no indication of re-occupancy of abandoned areas.

The highest noise levels would likely occur during drilling and gas flaring (Tribal Energy and Environmental Information Clearinghouse, 2013). Noise from drilling has been measured at 115 dBA at well sites, comparable to drilling for other activities (i.e., geothermal development), and is consistent with noise levels generated from other industrial activities (U.S. Dept. of Energy, 2006; Tribal Energy and Environmental Information Clearinghouse, 2013). Sound levels above 50 dB are considered potentially deleterious to wildlife (Reijnen et al, 1997). It is difficult to calculate noise attenuation across a non-uniform environment, but utilizing the Inverse Square Law (Nave, 2005) suggests the 50 db noise level from the well pad would be achieved approximately 1.1 miles from the well site. Because topography and other conditions dampen sound, for purposes of this analysis we used a 1 mile “disturbance footprint” around the well site, increasing the affected acres from 3.5 to 2,010 acres. This “disturbance footprint” of 1 mile around the well site is consistent with research on big game species as well. Research on mule deer suggests disturbance from oil and gas development can extend from 0.25 to 2.2 miles from the well pad and roads (Dyke, et al., 2011), and elk were found to strongly select habitats greater than 6,500 feet away from oil and gas wells (Hayden-Wing Associates, 2011). This “disturbance footprint” would likely be avoided by many species, depending on their sensitivity to noise and human activity, and whether they have previously habituated to some amount of human activity that is present in the subdivision. These indirect effects due to noise from drilling, construction, increased truck traffic and increased human activity at the site is expected to last 45 days, with some of the disturbance potentially occurring 24 hours per day.

Taking the larger “disturbance footprint” into account, and utilizing Colorado Parks and Wildlife mapped wildlife use areas, the project could result in up to a 21% reduction of available mule deer winter concentration habitat, a 15% reduction of available elk severe winter habitat, and 10% of pronghorn winter range within this watershed (see Table 8). Winter habitat is believed to be a limiting factor for many of the big game species that utilize this area (Magee, 2012).

However, adjacent lands outside this watershed do provide additional winter range habitats for elk, mule deer and pronghorn.

FIGURE 12 - ELK HABITAT NEAR PROPOSED WELL SITE

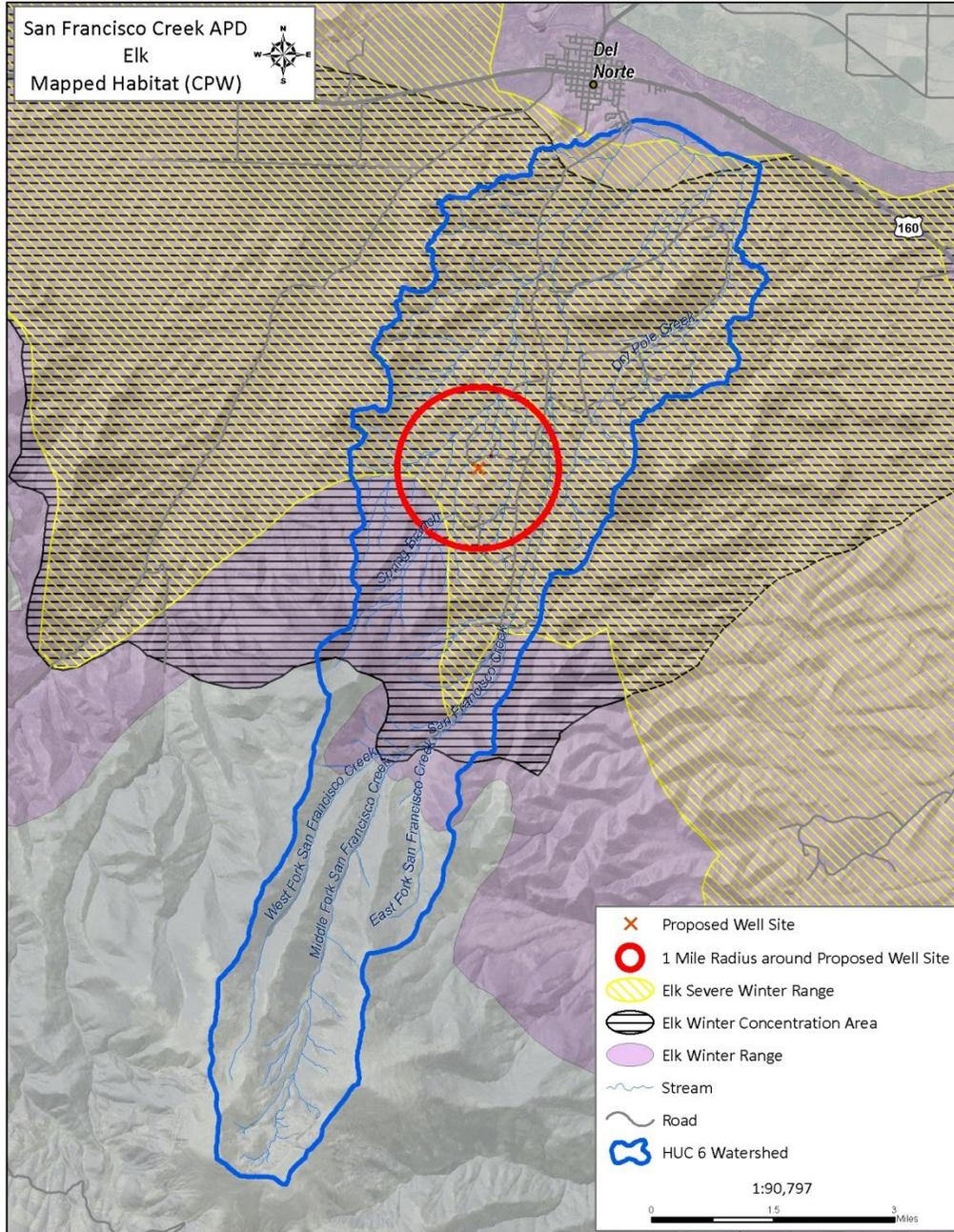


FIGURE 13 – MULE DEER HABITAT NEAR PROPOSED WELL SITE

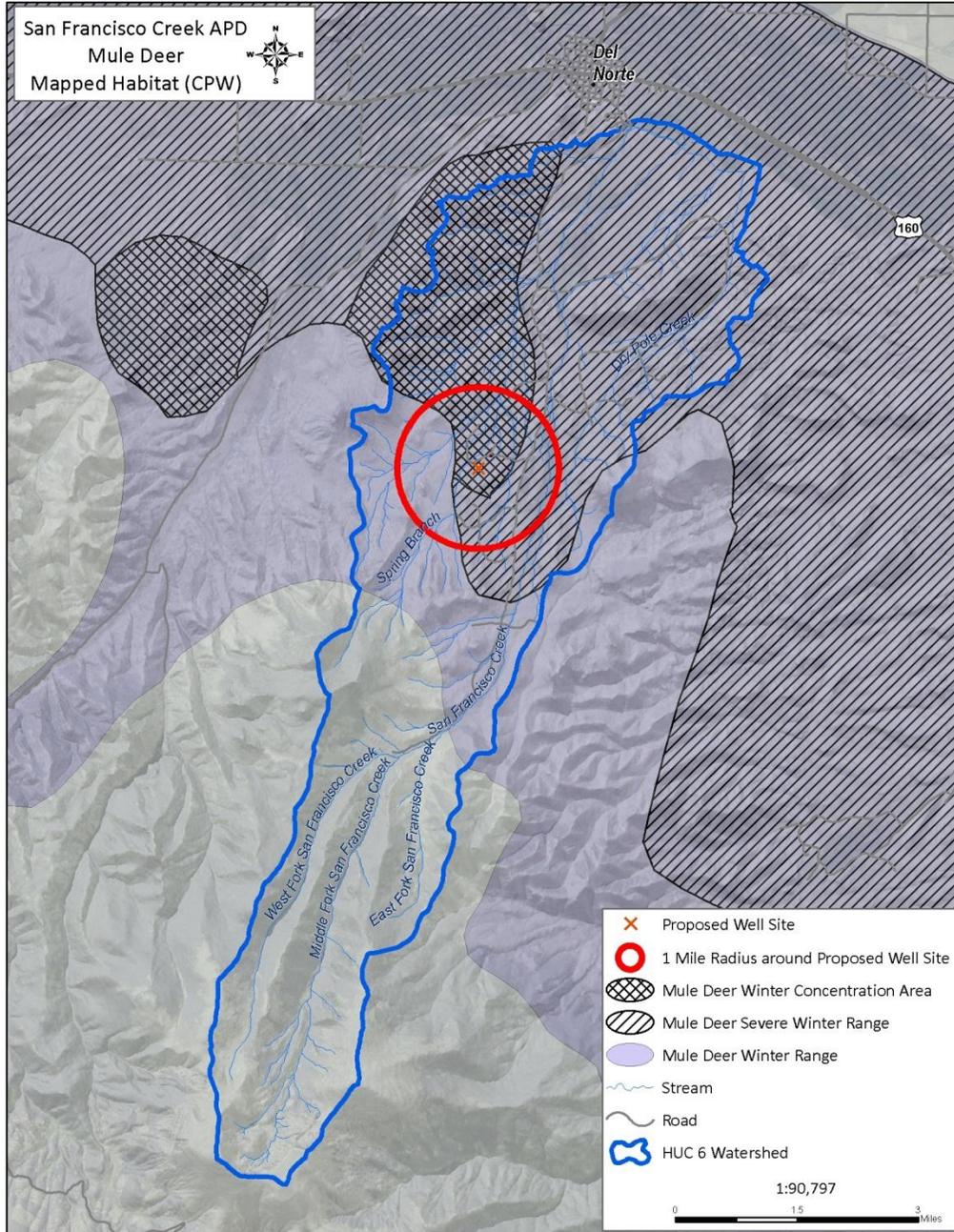


FIGURE 14 – PRONGHORN HABITAT NEAR PROPOSED WELL SITE

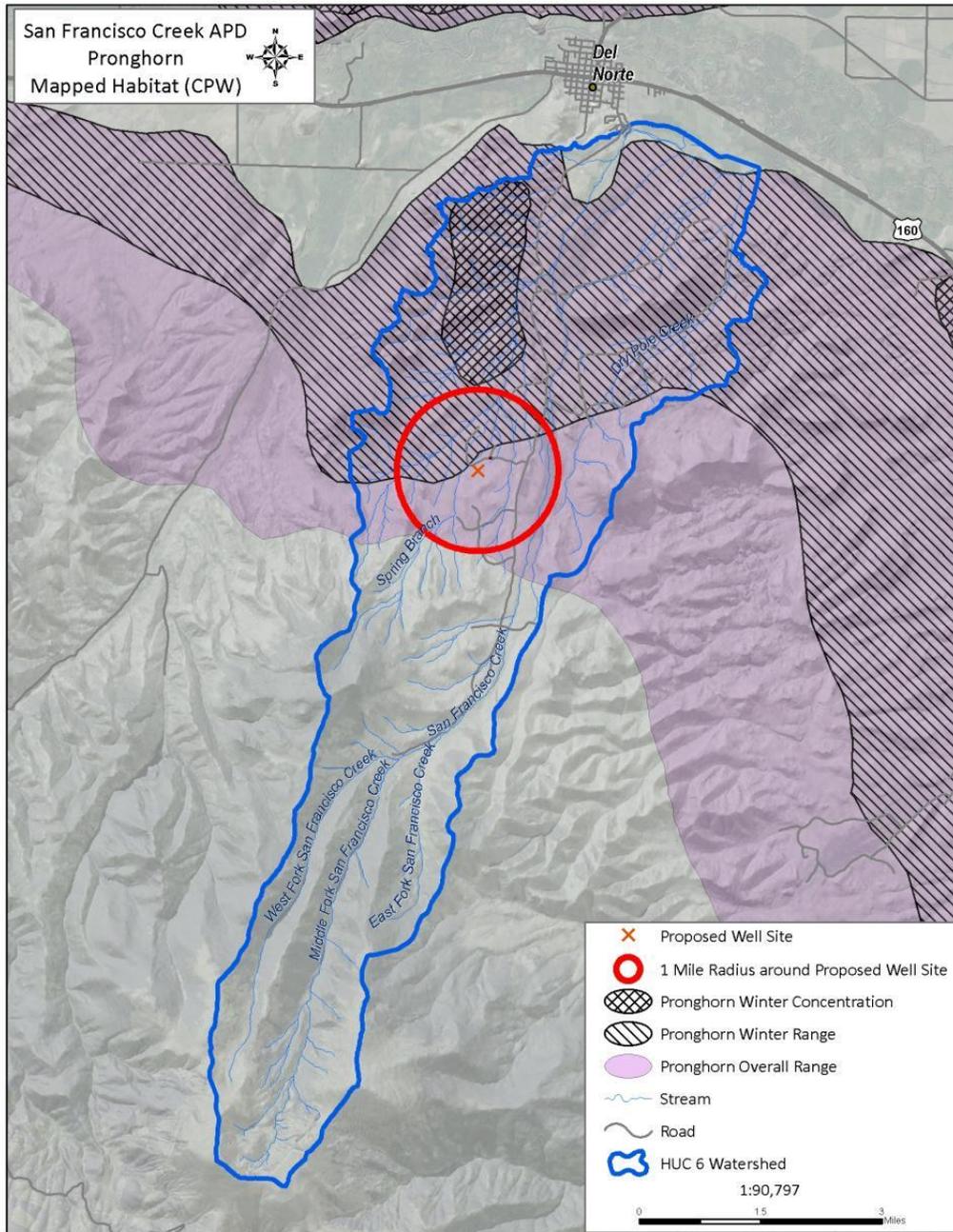


TABLE 8 - HABITAT AVAILABILITY WITHIN THE 6TH LEVEL WATERSHED, INCLUDING ACRES AFFECTED BY PROPOSED PROJECT.

Mapped Habitat - Species	Acres of habitat within 1 mile	Mapped habitat acres in watershed	% habitat affected in the watershed
Elk Severe Winter	1,846	12,124	15%
Elk Winter Concentration	2,010	14,316	14%
Elk Winter Range	2,010	15,783	13%
Mule Deer Severe Winter	1,411	10,572	13%
Mule Deer Winter Concentration	677	3,155	21%
Mule Deer Winter Range	2,010	14,042	14%
Pronghorn Winter Range	830	8,635	10%

Despite any disturbance caused by the existing subdivision, CPW has documented wildlife use in the area, particularly when there is heavy snow because of the availability of woody species for forage and south facing slopes having faster snow melt (Ferrero, 2013). Current development appears disperse enough that many species, including deer, elk and pronghorn still utilize this area (Ferrero, 2013).

While wildlife in the area may be habituated to some amount of human activity that is present in the subdivision, it is possible that increased activity and noise during construction and exploratory drilling stages could result in increased avoidance of this area and displacement of wildlife during that time. This is expected to be a temporary impact, as all activities are expected to be completed within 45 days. In the event that oil is found in economically feasible quantities, additional development could occur, extending this impact beyond the 45 days contemplated in this proposed action. Additional surface disturbing activities, while not reasonably foreseeable under this proposed action, would be analyzed under NEPA.

Effects from additional disturbance and noise at the well site will be mitigated through noise mitigation measures (including hay bales around well site to dampen noise, as specified in the Drilling Plan), and more importantly, a winter timing limitation to protect big game species during the time when habitat is most limited for these species. No surface use (excluding operation and maintenance of production facilities) from December 15 through March 31 is allowed as per Lease Stipulations, and an expanded seasonal timing limitation on drilling from

December 1 through April 30 (as recommended by Colorado Parks and Wildlife), is necessary to protect these species that are undergoing additional stress during the winter months and as a result of diminished habitat quality due to the continued drought.

Other indirect effects could include soil compaction and damage to vegetation in the area from construction activities. This could increase erosion on the site and the potential for expansion of noxious weeds in these disturbed areas. The spread of noxious weeds makes it more difficult for native species to reestablish in disturbed areas, threatening the continued existence of native species on the site. This can affect wildlife by reducing habitat quality and species diversity, thereby affecting foraging and breeding behavior. See vegetation analysis, Section 3.3.1, for more information.

Groundwater is connected to important surface water habitats (perennial and ephemeral stream channels, ponds and springs) that species rely on. Although the exact interactions between surface and groundwater may not be fully understood, it is possible that effects to groundwater in this area could impact the wildlife resource. Therefore, protection of groundwater is essential. During the drilling process, the proposed well could pass through groundwater bearing formations. See water analysis, section 3.2.4, for more information.

Because the surrounding area will still provide relatively intact, important wildlife habitat, and because the project is only projected to last 45 days, the effects of this potential loss of habitat can be kept to a minimum with the implementation of mitigation measures, including timing limitations, BMPs, and other protective measures identified in the drilling plan and COAs. Therefore, population-level effects on species are considered to be minimal.

Mitigation Measures

- Provide additional protection of big game winter range by allowing no drilling from December 1 to April 30.
- Construct, modify and maintain all open-vent exhaust stacks to prevent birds and bats from entering, and to discourage perching, roosting and nesting (required by the Migratory Bird Memorandum of Understanding between BLM and USFWS, and required by Executive Order 13186 for the protection of Migratory bird species).
- Conduct raptor nest surveys within a 0.5 mile radius of the project site, prior to any ground disturbing activities to protect any existing raptor nest sites, and to be in compliance with the Migratory Bird Treaty Act (MBTA) and the Memorandum of Understanding between BLM and USFWS required by Executive Order 13186.

- If any raptor nests are located, apply appropriate timing limitation.
- Conduct winter eagle roost survey. No surface use is allowed within 0.5 miles of an active winter roost site between November 15 and March 15 (Colorado State Stipulation for Bald eagle).

TABLE 9 – OVERVIEW OF TIMING RESTRICTIONS

Species/ Group	Dates	Restriction	Source
Migratory Bird	May 15 thru July 15	No Surface Disturbing Activities	Migratory Bird Treaty Act
Bald Eagle*	Nov. 15 – Mar. 15	No Surface Use within ½ mile of active winter roost	Colorado State Stipulation
Gunnison Prairie Dog*	March 1 thru June 15	No Surface Disturbing Activities	Colorado State Stipulation
Big game winter habitat	Dec 1- April 30	No Drilling	Colorado Parks and Wildlife Recommended Stipulation
Big Game winter habitat	Dec 15-March 31	No Construction and No drilling	Lease Stipulation

*stipulation only applies if species found during pre-work surveys.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Nov	Dec				
			Operational Period if no GPD, (Construction, (if no GPD)	Full Operational Period	Migratory Bird – no surface occupancy	Full Operational Period – July 15 – Nov. 30 (Nov. 15 if active Bald Eagle Winter Roost within ½ mile of site)								
		Bald Eagle Winter Roost – No surface use w/1 ½ mile												1) Bald Eagle Winter Roost - No surface use w/1 ½ mile *
		2) Gunnison’s Prairie Dog* - NSO												
		Big Game Winter Habitat – No drilling (through Apr. 30) No Construction (through March 31)		Operational period if										3) Big Game Winter Habitat – no drilling

Cumulative Effects

The Proposed Action, while limited in size and duration and therefore somewhat limited in terms of its local impact on wildlife species, adds to the cumulative effect of habitat loss and decreased habitat quality that is occurring in this general area for wildlife species. Issues affecting available habitat in the San Luis Valley include agricultural developments, housing developments, impacts from several years of intense drought conditions, fire suppression, and recreation activities all resulting in overall habitat loss or reduction in habitat quality and increased stress on wildlife species. Activities potentially affecting wildlife species in the project area include habitat fragmentation from subdivision development including home construction, road and driveway construction, fences, increased human and pet presence, grazing and decreased forage and water levels due to drought. With the implementation of the proposed mitigation measures, operational requirements, and BMPs, it is anticipated that environmental consequences of displacement of wildlife species and loss of habitat would affect some individuals but is not likely to cause a trend towards Federal listing, as effects are localized in nature.

No Action Alternative:

Direct and Indirect Effects: Under the No Action Alternative, the proposed project would be denied and there would be no additional impacts to wildlife species.

Cumulative Effects: As there would be no direct or indirect effects under this alternative, there would be no additional cumulative effects from this project.

Finding on the Public Land Health Standard for plant and animal communities: Overall, the project area is generally meeting the land health standards for terrestrial wildlife communities; however, this project adds incrementally to longer term and larger-scale habitat concerns and increases the amount of disturbance that reduces the utility of adjoining habitats. However, due to the localized effects and limited duration of this project, it is not expected to compromise continued landscape level maintenance of the standard.

3.3.5 MIGRATORY BIRDS

Affected Environment:

Migratory birds are species that in the course of their annual migration traverse certain parts of the United States, Canada, Mexico, Russia, or Japan. This includes long-distance migrants, short-distance migrants, and resident species. The Migratory Bird Treaty Act of 1918 makes it unlawful to pursue, hunt, kill, capture, possess, sell, purchase, or barter any migratory bird,

including the feathers or other parts, nests, eggs, or migratory bird products. In addition, Executive Order 13186 (signed in 2001) makes federal agencies responsible for implementing bird conservation principles by ensuring that any federal action evaluates its effects upon migratory bird populations, and directs agencies to review the list of Birds of Conservation Concern (BCC) (USDI Fish and Wildlife Service, 2008) developed for the Bird Conservation Regions (BCRs) of the United States when assessing species that may occur. Land administered by San Luis Valley Field Office occurs within the Southern Rockies/Colorado Plateau Bird Conservation Region (BCR 16), which encompasses portions of Colorado, New Mexico, Arizona, Utah and Wyoming. The project and surrounding area provides suitable habitat for a variety of migratory birds that may utilize the vegetation communities within the project area (Table 1) during the nesting period (typically May 15 – July 15) or during spring and fall migrations.

The elevation at the project site ranges from approximately 8,520 to 8,560 feet. Habitat within and adjacent to the project area is categorized as Southern Rocky Mountain Montane-Subalpine Grassland vegetation (RS/ GIS Laboratory, College Of Natural Resources, 2004). At the project site the vegetation community is mostly composed of Green’s rabbitbrush (*Chrysothamnus greenei*), winterfat (*Krascheninnikovia lanata*), blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), bottlebrush squirreltail (*Elymus elynoides*), and minor amounts of fourwing saltbush (*Atriplex canescens*), pricklypear cactus (*Opuntia polyacantha*), and soapweed yucca (*Yucca glauca*).

The proposed action would occur on privately owned surface lands within a small subdivision community, with homes developed on 35-acre lots. Subdivision development including home construction, road and driveway construction, fences, increased human and pet presence, lights and noise associated with the subdivision has occurred. This development has likely increased habitat fragmentation and reduced the overall quality of habitat available for species in this area, particularly for species more sensitive to disturbance (Knight et al, 1995, McClure et. al, 2013).

TABLE 10 - MIGRATORY BIRD TABLE: USFWS BIRDS OF CONSERVATION CONCERN (BCC) FOR BIRD CONSERVATION REGION 16 AND THEIR STATUS WITHIN THE PROJECT AREA

Species	Important Features and Life History Considerations	Occurrence within Analysis Area
American Bittern	<ul style="list-style-type: none"> • Utilizes freshwater marshes with tall vegetation for breeding. • Utilizes wetlands of many sizes and types 	No

Species	Important Features and Life History Considerations	Occurrence within Analysis Area
Bald Eagle	<ul style="list-style-type: none"> • Need large bodies of water with fish for food source • Nest in large diameter trees near open water 	Yes, winter range
Ferruginous Hawk	<ul style="list-style-type: none"> • Needs close proximity to high quality grasslands. Encountered in grasslands and other open habitats at lower elevations (2,800-5,500') and open to dense stands of shrubs and low trees at middle elevations (5,000-7,500') • Prefers forest edge or mature, isolated, flat-topped junipers, with thick support branches for nest 	Yes
Peregrine Falcon	<ul style="list-style-type: none"> • Breed on cliff and rock outcrops higher than 60 m (200ft) within pinyon-juniper and ponderosa pine zones. • Nest site within a mile of water • Can forage 25 miles from nest site 	Yes
Gunnison's sage-grouse	<ul style="list-style-type: none"> • Sagebrush obligates; Prefer large expanses of big sagebrush (between 20-30% canopy cover • Requires big sagebrush for food, nesting, brood rearing, and roosting. • Utilize riparian meadows for brood and summer habitat • Only Found at Poncha Pass 	No
Snowy Plover	<ul style="list-style-type: none"> • Sandy beaches or alkaline flats with little to no vegetation • Nest with 150 m (500ft) of water 	No
Mountain Plover	<ul style="list-style-type: none"> • Requires substantial amount of bare ground. Cover can be extremely short. Some shrubs or junipers are tolerated. • Some denser or lush grasses necessary for young. • Can be associated with prairie dog towns. Is loosely colonial. 	Yes
Willow Flycatcher	<ul style="list-style-type: none"> • Breed in dense riparian habitat with willow and elder as the dominant species. Perhaps with cottonwood overstory • Primarily nest in elder and willow for 1-24 m in height (average height 7.6 m) • Nest near lentic water 	No
Burrowing Owl	<ul style="list-style-type: none"> • Treeless areas with short vegetation (< 4 inches) • Usually associated with prairie dog colonies • Nest in previously dug burrows 	Yes
Yellow-billed Cuckoo	<ul style="list-style-type: none"> • Requires riparian vegetation associated with Cottonwoods • Nest within Cottonwoods trees 	No
Brewer's sparrow	<ul style="list-style-type: none"> • Tied closely to tall, dense sagebrush stand with small grass opening for breeding • Nest in shrubs (willows, sagebrush, rabbitbrush, etc.) • Prefers abundance of shrub cover. 	Yes
Golden Eagle	<ul style="list-style-type: none"> • Breeds in open and semiopen habitats upto about 11,900'. • Nest in cliffs near open habitat. Human distrubance can cause abandonment of nest site. • Territories may be abandoned due to major fires in areas. • Jackrabbits are a primary food source in shrub-steppe habitats. 	Yes

Species	Important Features and Life History Considerations	Occurrence within Analysis Area
Prairie Falcon	<ul style="list-style-type: none"> • Prefers open grasslands and shrub-grassland. • Ledges and cavities in cliffs or bluffs are common nest sites. Nesting sites are highly limiting. • Ground squirrels are an important breeding food source. Horned larks and meadowlarks are important non-breeding food sources. 	Yes
Long-billed Curlew	<ul style="list-style-type: none"> • In Colorado, Nest in close proximity to standing water • Forage in grasslands, agricultural fields, and wet meadows 	No
Juniper Titmouse	<ul style="list-style-type: none"> • Dense canopies of Pinyon-juniper woodlands • May forage on ground • Nest in trees 	No
Flammulated Owl	<ul style="list-style-type: none"> • Most closely associated with open ponderosa pine. Often also associated with aspen or larger shrub oaks, and clearing. • A secondary cavity nester. • Almost exclusively insectivorous, U.S populations are highly migratory 	No
Lewis's Woodpecker	<ul style="list-style-type: none"> • A very large open canopy, and standing dead or downed snags are important for perches and food sources • Found open cottonwood-dominated riparian woodland. Cottonwood forests are preferred at lower elevations. • In burned forest, may move in several years after a fire. • Nests in large, dead or decaying trees often just before a branching limb. Nest trees are larger and taller than random sample. 	No
Pinyon Jay	<ul style="list-style-type: none"> • Needs large stands of Pinyon- Juniper or Ponderosa Pine with large trees over extensive area: need to move from crop to crop, as pine nut production is sporadic. • Pine seed availability is the primary factor in breeding site selection • Nests in dense, mature stands of pinyon-juniper • Up to 8mi (13km) daily range 	No
Bendire's Thrasher	<ul style="list-style-type: none"> • Prefers relatively open grassland with large scattered shrubs and/or trees for nesting (cholla, junipers, or sagebrush are usually present) • May use dense vegetated washes or riparian areas. 	Yes
Brown-capped Rosy Finch	<ul style="list-style-type: none"> • Uses cirque headwalls, talus slopes and permanent or late-melting snowfields above 11,000 feet in elevation • Nests on cliffs or on the ground, both with an overhanging rock for concealment. Nests often placed near snowfields and situated so that sunlight does not hit the nest. • Frequently forages at the edges of snowfields for seeds and torpid insects gleaned from snowbanks. 	No
Cassin's Finch	<ul style="list-style-type: none"> • Open coniferous forest. Often found in mature forests. Are usually found between 1000 – 3000 m (3300-9800') • Nests tend to be placed greater than 5 m (16') above ground, usually well out on lateral branch or near top of crown. 	No

Species	Important Features and Life History Considerations	Occurrence within Analysis Area
	<ul style="list-style-type: none"> • Forage mostly on ground; removes seeds from open cones, and insects (bud worm and tussock moth) from conifer foliage. 	
Grasshopper Sparrow	<ul style="list-style-type: none"> • Mid to tall Grassland (> 4 inches) with less than 34% shrub cover • Require some bare ground for feeding • Nest on ground • Requires some shrubs for singing perches 	Yes
Veery	Species do not occur or are considered accidental within the SLV	
Gray Vireo		
Black Rosy Finch		
Grace's warbler		
Chestnut-collared longspur		

A review of the migratory bird table indicates that five species on the BCC List for BCR 16 are excluded from analysis because they do not occur or are considered accidental within the San Luis Valley and will therefore not be affected by any management actions. These species include the veery, gray vireo, black rosy finch, Grace's warbler, and chestnut collared longspur. Species that do not occur or do not have habitat present in the HUC are those labeled "No" in the Occurrence column of the table above.

The information provided in the migratory bird table indicates that nine species designated as Birds of Conservation Concern (BCC) for BCR 16 could breed in or near the analysis area or migrate through the general vicinity. Most migratory bird use in the San Luis Valley is limited to the summer period due to the harsh fall, spring and winter months. Most birds arrive during late spring (April/ May) and migrate from the area in early fall (August/ September). The species present during summer are most likely breeding and rearing young. Most species on the BCR 16 list follow this migration pattern; however, a few species are present during the wintertime. Resident species that spend all or part of the winter in the San Luis Valley include the ferruginous hawk, golden eagle, Gunnison's sage-grouse, burrowing owl, peregrine falcon, prairie falcon, Lewis's woodpecker, and pinyon jay. Of these winter resident species

ferruginous hawk, golden eagle, peregrine falcon, prairie falcon, and burrowing owl have potential year-round habitat present in the project or adjacent areas.

Environmental Effects

Proposed Action

Direct and Indirect Effects

A primary concern for migratory birds from actions analyzed by this EA involves direct and indirect effects of surface disturbing activities of the grassland/ shrubland habitat and subsequent activity associated with well development. Disturbance from these activities includes the potential for destruction of nests, loss of life of the individual due to collisions with vehicles or by other means, and disturbance to individual birds that can cause them to abandon a nest or an area during the nesting season which would lower individual reproductive success and fecundity (the number of offspring a female produces over her lifetime). Although the immediate project area may not provide nesting habitat for raptors, potential raptor nesting could occur within 0.5 miles of the project area. Thus, nesting raptors could be impacted by increased human disturbance, construction activities, etc. during this period, as they will forage in excess of 0.5 miles from an active nest. Human activity and habitat alteration in close proximity to raptor nests has been shown to adversely impact nest success (Colorado Parks and Wildlife, 2002; Andersen, Rongstad, & Mytton, 1990; Richards & Clinton, 1997; White & Thurow, 1985; Holmes, Knight, Stegall, & Craig, 1993; Oxley, Fenton, & Carmondy, 1974).

Direct impacts are those that cause disturbance to individual birds or take of a nest. Direct impacts of construction of well pad and access road and increased human and vehicular activity during well drilling operations may include disturbance to roosting and foraging birds. Take of an individual or a nest is possible with construction and operation activities, through vehicle collisions or inadvertent crushing of individuals or nests during the construction phase. In addition, sources of water may congregate several species of migratory birds that require open water. Migratory birds may be burned or killed by exhaust vents, heater-treaters, flare stacks, etc., if birds perch at the opening while in operation.

Indirect impacts are those that remove habitat from use or availability to migratory birds in the present or future, or cause indirect impact to individuals. Indirect impacts include the potential loss of minimally productive grassland/shrubland habitat and disturbance to soils and vegetation that may have provided limited nesting habitat. Birds will likely avoid the area

during times of high human/vehicle activity, resulting in a temporary loss of usable habitat. While migratory birds utilizing this site may be habituated to some amount of human activity that is present in the subdivision, it is likely that the increased activity and noise during the construction and exploratory drilling stages would result in increased avoidance of this area and displacement of species during that time. Many species are sensitive to increases in noise, and the increased stress may cause disruption of breeding, migration, wintering, foraging, and other behavioral activities. Low-level noise from operation of the well could have long-term effects on species, causing them to avoid the area, or potentially putting chronic stress on animals, affecting their energy budget, reproduction, and long term survival (Radle, 2007). Acoustical cues play a dominant role in sexual communication, territory defense, habitat quality assessment, and predator-prey interactions (Barber, Crooks, & Fristrup, 2009), and may be impacted by low-level noise. Studies have documented substantial changes in foraging and anti-predator behavior, reproductive success, density, and community structure in response to noise (Kight & Swaddle, 2011). Because reproductive success and nutritional condition can decrease due to increased energy expenditures resulting from physical response to disturbance, it is important to minimize these effects through the implementation of mitigation measures/stipulations, which require restricting disturbance during the period when animals are most stressed.

Displaced birds can likely find usable, undisturbed habitats in the area adjacent to the project site. Because the surrounding area will still provide relatively intact, important wildlife habitat, and because the project is only projected to last 45 days, the effects from this project can be kept to a minimum with the implementation of mitigation measures, including timing limitations, BMPs, and other protective measures identified in the drilling plan and COAs. Therefore, population-level effects on species are considered to be minimal.

Protective/Mitigation Measures: The following measures are required in order to be in compliance with the Migratory Bird Treaty ACT (MBTA) and the Memorandum of Understanding between BLM and USFWS required by Executive Order 13186.

- Enforce a timing limitation from May 15 thru July 15 for any surface disturbing activities to protect migratory bird nesting and brood rearing, and to be in compliance with the Migratory Bird Treaty ACT (MBTA) and the Memorandum of Understanding between BLM and USFWS required by Executive Order 13186.

- Construct, modify and maintain all open-vent exhaust stacks to prevent birds and bats from entering, and to discourage perching, roosting and nesting to be in compliance with the Migratory Bird Treaty ACT (MBTA) and the Memorandum of Understanding between BLM and USFWS required by Executive Order 13186.
- Conduct raptor nest surveys within a 0.5 mile radius of the project site, prior to any ground disturbing activities to protect any existing raptor nest sites, and to be in compliance with the Migratory Bird Treaty ACT (MBTA) and the Memorandum of Understanding between BLM and USFWS required by Executive Order 13186.
- If any raptor nests are located, apply appropriate timing limitation.

Cumulative Effects

The Proposed Action, while limited in size and duration and therefore somewhat limited in terms of its local impact on migratory birds, adds to the cumulative effect of habitat loss and decreased habitat quality that is occurring in this general area for bird species. Issues affecting available habitat in the San Luis Valley include agricultural developments, housing developments, impacts from several years of intense drought conditions, fire suppression, and recreation activities all resulting in overall habitat loss or reduction in habitat quality and increased stress on migratory birds. Activities potentially affecting these species in the project area include habitat fragmentation from subdivision development including home construction, road and driveway construction, fences, increased human and pet presence, grazing and decreased forage and water levels due to drought. With the implementation of the proposed mitigation measures, and design features, it is anticipated that environmental consequences of overall habitat loss or reduction in habitat quality for migratory birds would affect some individuals but is not likely to cause a trend towards Federal listing, as effects are localized in nature.

No Action Alternative:

Direct and Indirect Effects: Under the No Action Alternative, the proposed project would be denied and there would be no impacts to migratory birds.

Cumulative Effects: As there would be no direct or indirect effects under this alternative, there would be no additional cumulative effects from this project.

3.4 HERITAGE RESOURCES AND HUMAN ENVIRONMENT

3.4.1 CULTURAL RESOURCES

Affected Environment:

This analysis of the affected environment for cultural resources is focused within the split estate oil and gas lease of 34 acres owned by Dan Hughes CO. The subsurface is federally owned and administered by the BLM's San Luis Field Office (SLVFO). The BLM has the legal responsibility to identify and consider the effects to cultural properties on private land that result from a federal action. In this case, the federal action is the issuance of a BLM permit to explore for oil and gas on this lease parcel. This federal action constitutes an undertaking according to the National Historic Preservation Act of 1966 (NHPA), as amended, and requires that ground-disturbing activities be surveyed for cultural resources in order to comply with the Act's implementing regulations under the Secretary of the Interiors Standards and Guidelines for Historic Preservation (36 CFR 800). In 2010, a 100% (Class III) cultural resource inventory of the 34 acres was conducted by Metcalf Archaeological Consultants Inc. A detailed analysis was documented in a Section 106 NHPA report by the contractor. The BLM reviewed and sent the report to the Colorado State Historic Preservation Office (COSHPO) for concurrence.

Cultural resources in this area are within the Rio Grande Basin cultural context (Martorano et.al. 1999). Both historic and prehistoric resources are present in the general vicinity. Prehistoric resources consist of those sites associated with aboriginal peoples such as open lithic scatters, rock shelters, rock art panels, stone habitation sites, and game blind structures. Historic resources consist of sites associated with farming and ranching expansion such as homesteads, railroads, and stock driveways. Given the distance to permanent water, the potential for significant archaeological resources is low. Ground visibility is extremely good due to shallow rocky soils and scant vegetation. Local bedrock is exposed across the parcel with evidence of poor soil development.

The pre-field (Class I) analysis for cultural resources utilized the records of the COSHPO, the cultural resource atlas of the SLVFO, all relevant Cultural Resource Management (CRM) reports, General Land Office (GLO) plat maps, aerial photographs and historic photographs. The Class I assessment indicates no historic and prehistoric sites have been previously recorded within the project area. One cultural property (5RN1069) was identified within the well pad and access road location (refer to BLM Report Number 12-RG-DNFO-001) during the 2010 cultural resource inventory. It consists of a sparse lithic scatter with no diagnostic tools. Contract archaeologists

conducted ten shovel probes to test for buried cultural deposits with negative results. The site is recommended as *not eligible* to the National Register for Historic Places (NRHP). The site does not retain integrity and artifacts are resting on a deflated surface, or have been re-deposited downslope, and are clearly in a secondary context. There is no evidence to suggest that site 5RN1069 retains potential for an intact buried cultural level or that it is likely to provide information important to prehistory. The COSHPO concurred with the Determination of Effect from the contractor and the BLM on May 23, 2012. Further management of the site is not required.

Environmental Effects

Proposed Action

DIRECT AND INDIRECT IMPACTS:

Oil and gas drilling and attendant activities can have negative direct and indirect impacts to cultural resources. The cumulative effect is that over time fewer archaeological resources will be available to learn about past human lifeways, to study changes in human behavior through time, and to interpret the past to the public. Site documentation can mitigate the loss of cultural resources.

According to the 2004 revised regulations [36 CFR 800.4(d) (1)] for Section 106 of the *National Historic Preservation Act* (16 U.S.C. 470f) the recommended determination for the proposed action is *no historic properties effected* if the Discovery and Education Stipulation is implemented. Under the implementing regulations of Section 106 of the National Historic Preservation Act (36 CFR 800), sites considered *not eligible* to the NRHP may be directly affected once adequately recorded, evaluated, and concurrence is received from the State Historic Preservation Office regarding NRHP eligibility.

Protective/Mitigation Measures: None

Discovery and Education Stipulation:

1. Any cultural and/or paleontological resources (historic or prehistoric site or object) discovered by the BLM or any person working on the BLM's behalf, on public or Federal land shall be immediately reported to the Authorized Officer, Field Manager-BLM, Saguache, Colorado. The BLM or its contractors shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An

evaluation of the discovery will be made by the Authorized Officer to determine the appropriate actions to follow to prevent the loss of significant cultural or scientific values. The BLM will be responsible for the cost of the evaluation. Any decision as to proper mitigation measures to be taken will be made by the Authorized Officer after consultation with the Colorado State Historical Preservation Office.

2. Collection or disturbance of artifacts and other archaeological, historical, and paleontological materials by the BLM, its representatives, contractors, or employees, shall not be allowed. Offenders shall be subject to prosecution under the appropriate State and Federal laws.

No Action Alternative

DIRECT AND INDIRECT IMPACTS:

Under the *No Action* Alternative, the potential for direct effects to cultural resources from oil and gas drilling would be negligible. If there is no federal action, then there is no undertaking, as defined in 36 CFR 800.2(o), for Section 106 of the National Historic Preservation Act (16 U.S.C. 470f). The determination would be *No Effect*.

Protective/Mitigation Measures: Not applicable.

3.4.2 NATIVE AMERICAN RELIGIOUS CONCERNS

Affected Environment:

During previous tribal consultation for this area, no traditional cultural properties were identified. The Section 106 Report was sent to the Hopi and Jicarilla Apache tribes upon request. Face-to-face consultation on several projects, including the APD, was also conducted with the Navajo, Hopi, Jicarilla Apache, Picuris, Ute Tribes and the Pueblos of Taos, Picuris, Santa Ana and Santa Clara. The tribes have not expressed any concerns with this oil and gas project.

3.4.3 VISUAL RESOURCES

Affected Environment:

BLM has a responsibility for managing the visual (scenic) resources of public lands as established by the National Environmental Policy Act which requires that measures be taken to “assure for all Americans...aesthetically pleasing surroundings,” and FLPMA which states that “public lands will be managed in a manner which will protect the quality of scenic values of

these lands.” Visual Resources Management (VRM) is a system for minimizing the impacts of surface-disturbing activities and maintaining scenic values for the future. BLM uses the procedures and methods of its VRM system to support decision-making for planning activities and reviews of proposed actions on BLM lands and for making recommendations on non-Federal surface lands where BLM administers the sub-surface mineral estate (also known as ‘Split Estate’).

Since the proposed well pad and portions of the access road and related infrastructure would be constructed on private land, Federal lease terms regarding visual concerns are not applicable. Visual resource values for private lands are only protected by landowner discretion.

The Proposed Action would take place on Split Estate property that is consistent with VRM Class III. The area is characterized by small ranchettes of various acreages in a residential subdivision. The natural landscape is typified by open hillsides of mostly native vegetation, consisting primarily of grasses and shrubs with the occasional pinyon or juniper tree. The objective of VRM Class III, as defined in the BLM’s Handbook H-8410-1 – Visual Resource Inventory (BLM 1986), is described below.

- *The objective of VRM Class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.*

The visual resource analysis area includes the proposed well pad located on private land south of the Town of Del Norte. This viewshed is important to the people who live, work and recreate in the area. The Proposed Action would be located in the viewers foreground /middle ground, within 5 miles from Rio Grande County Road 13. BLM guidance states that lands with high visual sensitivity are those within five miles of a primary travel corridor and of moderate to very high visual exposure, where details of vegetation and landform are readily discernible and changes in visual contrast can be easily noticed by the casual observer. The visual impact analysis for this project is based on the views from two Key Observation Points (KOPs) representing the viewing angle and direction with the highest frequency of viewers as seen primarily from Rio Grande County Road 13 (San Francisco Creek).



FIGURE 15 - KEY OBSERVATION POINT 1 ASSOCIATED WITH THE PROJECT AREA (KOP 1)

KOP 1 is located at the intersection of Wagon Wheel Rd. and Wild Horse Road, looking southwest at the immediate site of the Proposed Action.

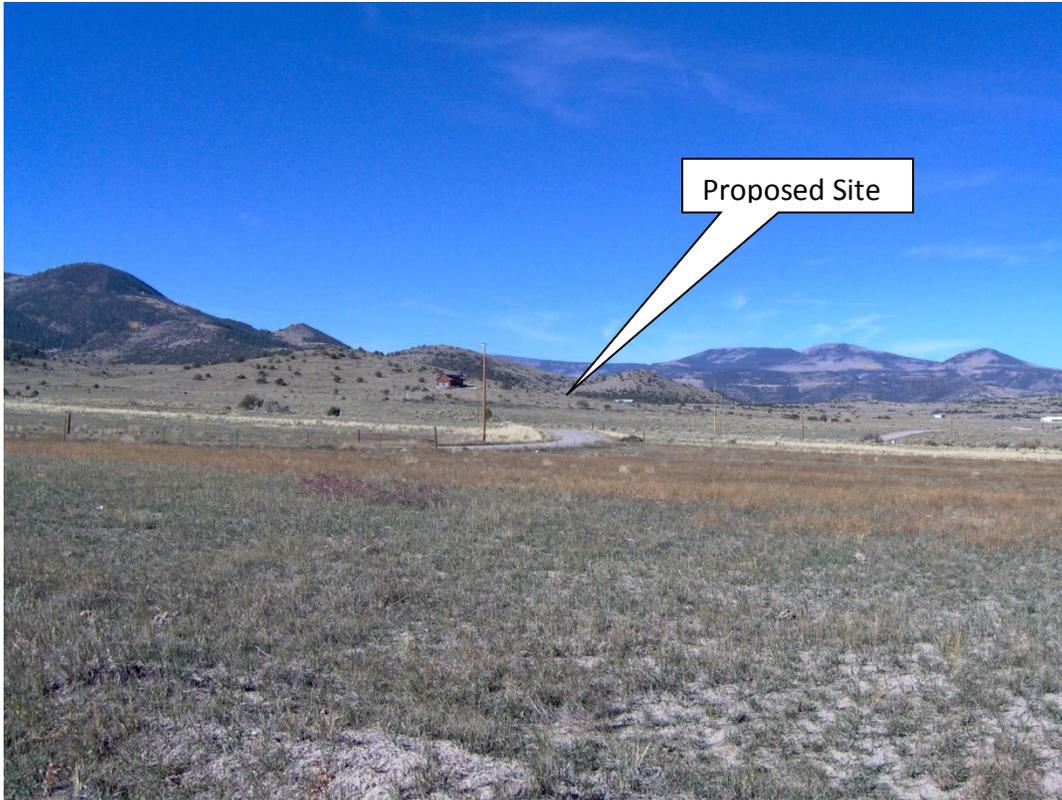


FIGURE 16 - KEY OBSERVATION POINT 2 ASSOCIATED WITH THE PROPOSED ACTION(KOP 2)

KOP 2 is located approximately .6 miles east of the project site at the intersection of CR 13 and Wagon Wheel Road and represents the location where the project would be most visible to viewers traveling south along CR 13.

In addition to analyzing the potential impacts of the Proposed Action immediately within the project area from KOPs, a viewshed analysis was conducted to determine the effects of the project from observation or visibility corridors near the project area. Using these two methods, the most dominant characteristics of the Proposed Action were identified and the results aided in defining which mitigation techniques would be the most effective.

Environmental Effects

Proposed Action

Direct and Indirect Impacts:

The proposed action would create short-term visual impacts (such as light pollution, dust, and increased traffic), due to construction, drilling and completion activities that would occur within the project area. The existing landscape would be changed by the introduction of contrasting elements within the landscape in the form of new lines, colors, forms, and textures. Such visual changes would be most evident during construction and completion activities. If the well is put into production, the pad would be re-contoured and vegetation re-established, and infrastructure would be painted to blend in with the general surroundings, the overall visual contrast and texture of the site during the daytime would be expected to adequately blend in with the surrounding landscape. Utilizing shrouded, downward lighting (as described in the Application for Permit to Drill by the Proponent) would also help to minimize night time light pollution and Loss of the Night Sky.

The proposed action would occur entirely on private lands. The pad would be 250' x 300', with a maximum cut of 6.95 feet on the southern edge and a maximum fill of 8.43 feet at the northeast corner. The total disturbance would be 3.22 acres. The pad would be most visible from the east as seen from Rio Grande County Road 13. The areas with the largest amount of cut/fill occur in locations that would be visible from each of the KOPs, however, the distance from the observable areas, the angle of view, and the scale as seen by the viewer would help to minimize the actual visible surface disturbance.

Protective/Mitigation Measures:

All new or modified fluid mineral developments (i.e. well pads, access routes, pipelines, etc.) on private property should adhere to *BLM's Best Management Practices for Fluid Minerals Management*

(http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/technical_information.html). The BMPs describe numerous design techniques that can be used to reduce the visual impacts from surface-disturbing projects. Design fundamentals and strategies are interrelated, and when used together, can help resolve visual impacts from proposed activities or developments.

Design fundamentals. General design principles are those that can be used for all forms of activity or development, regardless of the resource value being addressed. Applying the three fundamentals of 1) proper siting or location; 2) reducing unnecessary disturbance; and 3) repeating the elements of form, line, color, and texture help solve most visual design problems.

Design strategies. These include more specific activities that can be applied to address visual design problems and mitigate the visual impact of range activities, improvements and other related infrastructure and include the following:

- Color Selection -. Color selection should be made in accordance with the BMP criteria and utilizing BLM’s Environmental Color Selection Chart. Recommended color for painting infrastructure in the Dan A. Hughes San Francisco Creek APD #1 project is “Covert Green.”
- Earthwork - There are a number of ways to reduce the contrasts created by earthwork construction, including proper siting or location and linear alignment. Fitting fluid mineral developments to the existing landforms in a manner that minimizes the size of cuts and fills, and in accordance with the criteria defined in the BMP, will greatly reduce visual impacts from earthwork.
- Vegetative Manipulation - Plan, design, and locate vegetative manipulation in a scale which retains the color and texture of the characteristic landscape, borrowing directional emphasis of form and line from natural features.
- Structures – Structures should be designed to repeat the form, line, color and texture of the surrounding landscape. Locate structural improvements to meet Scenic Quality Objectives (i.e. utilize natural features to screen from view structures such as drill rigs, access roads, pipelines, etc.).
- Reclamation/Restoration – An important aspect of any surface-disturbing activity is to reclaim and restore the landscape to the greatest extent possible after project completion. The objectives of restoration and reclamation include 1) reducing long-term visual impacts by decreasing the amount of disturbed area and 2) blending the disturbed area into the natural environment while still providing for project operations.
- Linear Alignment Design Considerations - Proper siting and location of developments can often contribute significantly to the reduction of line and color impacts, making other measures either unnecessary, less costly and easier to accomplish. Considerations for fluid mineral developments include:
 - Place fluid mineral structures (such as drill rigs, access roads, pipelines, etc.) within the surrounding vegetation or in locations that minimize visibility, when such a location is feasible.
 - Minimize the amount of disturbance within view of travel ways (including roads, trails, and recreation areas).

No Action Alternative

Direct and Indirect Impacts:

Under the No Action Alternative, none of the components of the Proposed Action would be approved. The existing visual environment would remain in its current condition, with no new or additional impacts to scenic quality or visual resources.

Protective/Mitigation Measures: Not applicable.

3.4.4 SOCIOECONOMIC

Affected Environment:

For the purposes of this analysis, the area of influence is determined to be Rio Grande County. Currently there are no active wells in the county, either on federal or private mineral estate. The immediate area of drilling is in a rural subdivision south of Del Norte, Colorado.

TABLE 11 - RIO GRANDE COUNTY DEMOGRAPHICS

	Rio Grande	Colorado
Population 2011*	4) 11,915	5) 5,118,000,000
Population 2010	6) 11,982	7) 5,026,000,000
Population 2000	8) 12,413	9) 4,301,000,000
Population Change 2000-2010	10) -3.5 %	11) 16.9 %
Housing Vacancy Rate	12) 28.6 %	13) 9.8 %

* 2011 Estimates from Colorado State Demography Office

Environmental Effects

Proposed Action

Direct and Indirect Impacts:

The act of drilling a well for the production of fluid minerals will lead to several social and economic effects of varying impacts and duration. The fundamental effect of this action is to meet the demand for fossil fuel . This well will employ a small number of personnel; it is assumed the employees will be brought in from outside the local area, as the specialists required for drilling are not likely to be found in the local communities. The bulk of these

employees will likely remain for only a short duration, as the drilling and completion stages of the well are expected to take between 6-12 weeks. A portion of the non-specialized goods and services required by the drilling company will likely be acquired in the local area. These local purchases will help to support local businesses and workers.

The proposed action is also expected to increase governmental revenue, in terms of federal, state, and local treasuries. If fluid minerals can be produced profitably, the royalties on any mineral sales will be 12.5%. This royalty amount will be divided evenly between the federal government and the State of Colorado. Colorado's share of the royalties are further subdivided between state and local governments, with approximately 25% of Colorado's share disbursed directly to local governments, with the possibility of further state grants and loans to help mitigate any negative effects of mineral development. A share of state severance taxes on the depletion of mineral estate will be disbursed to the local communities, as well as an expected increase in local ad valorem tax revenue due to the drilling and production equipment. In addition, there will be an expected increase in sales tax revenue due to the purchases of local goods by the company and the temporary employees.

However, if the well does not prove to be profitable, then the majority of these theoretical revenue streams will be nonexistent. If the well is profitable, then there is a very strong likelihood of further drilling activity in the area in the future.

Possible negative social and economic effects are primarily due to the intensive nature of the drilling and completion stages of well development. The development will be noticeable to a broad area, in particular to other residents of the subdivision in which it is planned. Stipulations on drilling will mitigate some, but not all of these concerns, including fugitive dust, traffic, noise, and nighttime lighting. These negative impacts are expected to damage the scenic and rural nature of the area, though these effects are expected to be short-term in nature. The number of employees required for this action and the duration of the drilling activities is not expected to have any noticeable effect on the local community.

Protective/Mitigation Measures: None

No Action Alternative

Direct and Indirect Impacts:

Under the no action alternative, drilling would not occur. It is assumed that the demand for fluid minerals would be met by other fossil fuel sources, either domestic or foreign, or

renewable energy sources. None of the social and economic effects, either positive or negative, will occur.

Protective/Mitigation Measures: Not Applicable

3.4.5 ENVIRONMENTAL JUSTICE

Affected Environment:

Rio Grande County does have environmental justice communities, as the population of Hispanic residents is meaningfully greater than the state average.

TABLE 12 - RIO GRANDE COUNTY DEMOGRAPHICS (RACE, ETHNICITY, INCOME)

	Rio Grande	Colorado
White, Non-Hispanic	14) 56.8 %	15) 70.3 %
Hispanic	16) 41.6 %	17) 20.4 %
Poverty Rate, by Family	18) 12.5 %	19) 8.7 %
Unemployment, 2011	20) 9.3 %	21) 8.3 %

Environmental Effects

Proposed Action

Direct and Indirect Impacts:

None of the impacts of the proposed action as described in this environmental analysis would be expected to fall disproportionately on minority populations in the area.

No Action Alternative

Direct and Indirect Impacts:

Under the no action alternative, drilling would not occur and there would be no impacts, disproportionate or otherwise, to environmental justice communities.

3.4.6 WASTES, HAZARDOUS OR SOLID

Affected Environment:

There is no evidence of contamination or contaminants at the proposed project site. No hazardous material, as defined by 42 U.S.C. 9601 (which includes materials regulated under CERCLA, RCRA and the Atomic Energy Act, but does not include petroleum or natural gas), will be used, produced, transported or stored during project implementation.

Environmental Effects

Proposed Action

Direct and Indirect Impacts:

Possible contaminant sources associated with the drilling operations are:

- Storage and use of petroleum, oil and lubricants
- General hazardous substances and/or chemicals
- Concrete washout water
- Drilling water, mud and cuttings

Protective/Mitigation Measures:

The following mitigation will assist in reducing potential spills and resulting groundwater and/or soil contamination:

- All Above Ground Storage Tanks will need to have secondary containment and constructed in accordance with standard industry practices or an associated Spill Prevention Control and Countermeasures plan in accordance with State regulations (if applicable).
- If drums are used, secondary containment constructed in accordance with standard industry practices or governing regulations is required. Storage and labeling of drums should be in accordance with recommendations on associated MSDS sheets, to account for chemical characteristics and compatibility.
- Appropriate level of spill kits need to be onsite and in vehicles.
- All spill reporting needs to follow the reporting requirements outlined in NTL-3A.
- No treatment or disposal of wastes on site is allowed.
- All concrete washout water needs to be contained and properly disposed of at a permitted offsite disposal facility.

No Action Alternative

Direct and Indirect Impacts: Under the no action alternative, no elements of the proposed action would be approved. Therefore, there would be no hazardous waste impacts to the project area.

Protective/Mitigation Measures: None

CHAPTER 4 - CONSULTATION AND COORDINATION

4.1 List of Preparers and Participants

NAME	TITLE	AREA OF RESPONSIBILITY
Leon Montoya	Realty Specialist	Lands and Realty, Waste Hazardous or Solid
Nicolas Sandoval	Geologist	Minerals, Oil and Gas
Brain Garcia	Law Enforcement Ranger	Law Enforcement
Sue Swift-Miller	Wildlife Biologist	Aquatic Wildlife, Terrestrial Wildlife, Migratory Birds
Alyssa Radcliff	Wildlife Biologist	Aquatic Wildlife, Terrestrial Wildlife, Migratory Birds
Melissa Shawcroft	Range Management Spec	Vegetation
Sean Noonan	Outdoor Recreation Planner	Recreation, Wilderness, LWCs, Visual, ACEC, W&S Rivers, Transportation
Negussie Tedela	Hydrologist	Air Quality, Hydrology, Water Quality/Rights, Soils
Joe Velasquez	Cadastral Surveyor	Cadastral Survey
Eduardo Duran	Natural Resource Specialist	Air Quality, Invasive Plants, T&E Species, Farmlands
Paul Minow	Fuels Natural Resource Specialist	Fire Ecology, Fuels Management

Angie Krall (FS)	Archaeologist	Cultural Resources / Native American
Chad Meister	Air Quality Specialist	Air
David Epstein	Economist	Socioeconomics, Environmental Justice
Marvin Hendricks	Petroleum Engineer	Geology, Oil and Gas

CHAPTER 5 - REFERENCES

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Appendix A –

Draft EA Summarized Comments and Response

#1

Resource	Comment Summary
<i>Unique Land Tenure: Mexican Land Grant</i>	The EA assumes without explanation that the federal government possesses the right to allow mineral development on what is explained as a split-estate, with private surface and federal minerals. However, the project is in a Mexican Land Grant region. EA did not describe in Spanish that the proposed development of Land Grant minerals via an unsupported assumption that the federal/private split estate supersedes the Land Grant rights.
Response: The land where the action is proposed to take place is not part of a land grant that was recognized under acts of Congress related to disposition of lands under the Treaty of Guadalupe Hidalgo. Sec. 8 and 9, Act of July 22, 1854, 10 Stat. 308.	

#2

Resource	Comment Summary
<i>NEPA Adequacy Scoping comments</i>	The BLM must thoroughly explain why the proponent’s APD was determined to be the only significant issue and is being used to define a narrow project scope and range of alternatives. Without significant issues identified, there is no logical driver of action alternatives and no focusing of the Chapter 3 effects analysis. Scoping comments brought forth issues that were not addressed in the EA.
Response: Comments from the public brought forth in scoping were incorporated into the document as appropriate. See Section 1.6 of the EA for a description.	

#3

Resource	Comment Summary
<i>NEPA adequacy Narrow scope</i>	Narrow scope of analysis. The EA does not respond to reasonably, foreseeable, connected actions including infrastructure, socioeconomic, environmental justice and natural resources. Draft EA does not satisfy NEPA where the impacts to vegetation, wetlands, riparian, recreation, lands and realty, range management, forest management, fire management were dismissed from further analysis on the basis that the surface estate used to access the federal minerals may be privately owned. The EA did not analyze night skies and transportation. Dismissing entire areas of analysis based on severed surface and mineral ownership finds no basis and is contrary to established law recognizing that all reasonably foreseeable actions and impacts must be analyzed, regardless of ownership. <i>San Luis Valley Ecosystem Council v. US Fish and Wildlife = NEPA process must analyze not only the direct impacts but also the indirect and cumulative.</i>
Response: The EA has been revised to include additional areas of analysis that were omitted from the draft. Some areas (e.g., fire, range) are generally analyzed from the perspective of BLM management and private surface ownership negates analyzing that resource program area. Some commenters pointed out resource areas that were analyzed and can be found on the table of contents (e.g., Socioeconomics), while other resource areas were	

included under a more general heading, (e.g. night skies were analyzed under Section 3.4.3, Visual Resources).

#4

Resource	Comment Summary
<i>EIS preparation</i>	Request the preparation of an EIS based on the unique history and sense of place of the San Francisco Creek area. The EIS is needed due to the highly uncertain effects, unique risks that both the immediate drilling and the reasonable completion, production, and abandonment plans would have on the water resources in the basin. An EIS must be prepared where a federal action “may have a significant impact” upon the human environment. EIS is required for all major Federal actions significantly affecting the quality of the human environment.
<p>Response: The determination of whether to prepare an EIS can either take place at the outset of a project or at the completion of an EA, if the EA shows the action would have significant effects. The “unique characteristics of the geographic area” is one of the ten considerations for evaluating intensity of effects outlined in the BLM NEPA Handbook Manual (H-1790-1). However, the handbook states that “[u]nique characteristics’ are generally limited to those that have been identified through the land use planning process or other legislative, regulatory, or planning process...” The project area for this EA does not meet these criteria. Similarly, while “scientific, cultural, or historical resources, including those listed in or eligible for listing in the National Register of Historic Places” is identified in the BLM NEPA Handbook as a consideration for intensity of effects when determining significance, this project area does not meet this specific consideration.</p>	

#5

Resource	Comment Summary
<i>NEPA Adequacy public participation</i>	Many citizens of Rio Grande County and Conejos County speak Spanish, or Spanish as their first language. It would be helpful to provide project information in colloquial Spanish. And the EA was only available online. Unfortunately, of CCCW’s 402 members, only 70 have access to email and Internet. In order to satisfy NEPA’s public participation and for information purposes, bound versions of all NEPA documents must be provided in colloquial Spanish as well as English, since English remains a second language for SLV’s still-prevalent culture.
<p>Response: The draft EA was made available to the public at the San Luis Valley Public Lands Center in Monte Vista, Colorado and at the Del Norte Public Library in Del Norte, Colorado. The translation of materials related to this project into Spanish was found to be impracticable at this time.</p>	

#6

Resource	Comment Summary
<i>Purpose and Need</i>	The BLM has, to date, failed to identify a purpose and need for the DAHC proposal. The Agency has made it difficult for the public to get a sense of why this project continues to move forward.
<p>Response: The purpose and need for this project can be found in Section 1.3 of the document. The APD has moved forward because leasing of federal mineral estate and subsequent oil and gas development is a non-discretionary act established by Congress through the Mineral Leasing Act of 1920, as amended. That mineral</p>	

estate in the San Luis Valley available for oil and gas development was identified in the 1991 Resource Management Plan. The minerals involved with the current APD are among those identified for development. Additionally, the BLM has provided the Application for Permit to Drill to the public, both in print and online at http://www.blm.gov/co/st/en/fo/slvfo/Current_Planning_Efforts/San_Francisco_APD1.html

#7

Resource	Comment Summary
<i>Alternatives</i>	There is one Proposed Action being analyzed and one No Action alternative. The EA is lacking a range of alternatives.
Response: The BLM NEPA Handbook states in section 6.2.1, “the purpose and need statement helps define the range of alternatives.” The range of alternatives is proportional to the purpose and need of the EA as defined in section 1.3 of the document. Once the parcel is leased the operator has the right to develop, thus the limited range alternatives. Additional alternatives are generally developed at the leasing stage or even at the RMP stage, making those parcels available.	

#8

Resource	Comment Summary
<i>Infrastructure</i>	There is no infrastructure analysis for “reasonable foreseeable” connected actions such as full-scale production scenarios.
Response: Considering the history of failed attempts at exploiting oil and gas resources in this area, the BLM determined that analyzing “full-scale production scenarios,” as requested in public scoping comments, did not meet the threshold of “reasonably foreseeable” for this action. Further, in the event that this wildcat operation is successful, any application for further surface disturbing development would be required to go through additional NEPA analysis before proceeding. This has also been addressed in the “Alternatives Considered but Eliminated from Detailed Analysis” section (2.2.3) of the revised document.	

#9

Resource	Comment Summary
<i>Socioeconomics</i>	This proposal will unquestionably have socioeconomic impacts to the people of the SLV. The draft ignores both sense of place and unique local socioeconomic concerns. The cultural and historic value for local communities has not been closely examined. BLM should conduct a socioeconomic analysis.
Response: See response to comment 4. Additionally. Socioeconomic impacts of the proposed action are addressed in section 3.4.4 of the environmental analysis.	

#10

Resource	Comment Summary
<i>Visual Resources</i>	Request the strict conformance with the BLM Travel Management Plan and the Visual Resource Management Plan. Request the protection of National Register eligible cultural resources such as the C&TS RR, and Old Spanish Trail that could impact visual resource.
Response: The analysis within the EA conforms to the BLM’s Travel Management Plan, Visual Resources	

inventory, and Resource Management plan. See Section 3.4.3 for an analysis of Visual Resources. Transportation has been addressed in the document as part of Section 3.2.1, Air Quality and Climate.

#11

Resource	Comment Summary
<i>Environmental Justice</i>	Rio Grande County does have environmental justice communities, and the BLM must analyze the impacts to those individual communities and all environmental justice communities within a 50-mile radius as recommended by CEQ.
Response: Section 3.4.5 of the environmental analysis acknowledges the environmental justice communities of Rio Grande County. However, the presence of environmental justice communities – here, a greater proportion of Hispanic residents compared to the state of Colorado as a whole – does not necessarily mean that they are disproportionately impacted by the action being analyzed.	

#12

Resource	Comment Summary
<i>Public Safety</i>	DAHC Emergency Response Plan or Spill Response Plan not was included. The EA failed to address fire management planning and the specifics of the implementation.
Response: An Emergency Response Plan and Spill Response Plan are not considered part of the Application for Permit to Drill (as outlined in Onshore Order #1, Section II). However, the Surface Use Plan of Operations addresses some of these concerns and is available for review on the BLM’s website at: http://www.blm.gov/co/st/en/fo/slvfo/Current_Planning_Efforts/San_Francisco_APD1.html . Additionally, Onshore Order #1 requires, as part of the General Operating Requirements, that the operator “ <i>maintain structures, facilities, improvements, and equipment in a safe condition in accordance with the approved APD. The operator must also take appropriate measures as specified in Orders and Notices to Lessees to protect the public from any hazardous conditions resulting from operations. In the event of an emergency, the operator may take immediate action without prior Surface Managing Agency approval to safeguard life or to prevent significant environmental degradation. The BLM ... must receive notification of the emergency situation and the remedial action taken by the operator as soon as possible, but not later than 24 hours after the emergency occurred. If the emergency only affected drilling operations and had no surface impacts, only the BLM must be notified. If the emergency involved surface resources on other Surface Managing Agency lands, the operator should also notify the Surface Managing Agency and private surface owner within 24 hours. Upon conclusion of the emergency, the BLM or the FS, where appropriate, will review the incident and take appropriate action.</i> ”	

#13

Resource	Comment Summary
<i>Ecological and Biological Resources</i>	The EA did not adequately analyze dust, sand and air quality issues of concern in Conejos County and the SLV. No analysis of potential impacts on habitat fragmentation, landscape connectivity and specific wildlife impacts due to split estate. This is in error of NEPA adequacy.
Response: The EA addressed air quality issues in Section 3.2.1 of the document. Specific wildlife concerns are addressed in section 3.3 of the document.	

#14

Resource	Comment Summary
<i>Wildlife</i>	Questions the analysis drawing the conclusion that overall viability of wildlife, questions the viability of the species in the specific area of construction.
Response: The biological resources section (3.3 and subparts) have been substantially revised in response to comments received.	

#15

Resource	Comment Summary
<i>NEPA Adequacy</i>	Unclear analysis on development of site. Context and intensity is unclear. The analysis flips between one well and full production. No uniform unit of analysis.
Response: All effects analysis, analyzes at a minimum those design elements as described in the proposed action, including process and infrastructure for this exploratory (wildcat) well. Analysis area and scope may vary with individual resources depending the level of interaction the resource has with the given action.	

#16

Resource	Comment Summary
<i>Monitoring/Mitigation</i>	Unclear who is responsible for monitoring and mitigation is it, good faith, constituents, stake holders, BLM?
Response: The BLM has the responsibility to enforce the terms and conditions of any permit issued under its jurisdiction. For an oil and gas operation, that includes Petroleum Engineers, Petroleum Engineering Technicians, as well as other resource specialists.	

#17

Resource	Comment Summary
<i>NEPA Adequacy</i>	Inconsistent and incomplete effects analysis. Analysis should include impacts to San Francisco Creek Ranch Land Owners Association, town of Del Norte, water users, the air shed, and transportation.
Response: Analysis in the document is appropriate for each particular resource. The project area is defined in Chapters 1 and 2.	

#18

Resource	Comment Summary
<i>No flaring</i>	Questions the risk of fire (due to drought), from well flaring.
Response: It is BLM's experience that wildfire from well flaring is not reasonably foreseeable during the normal course of oil and gas exploration. However, there are best management practices included in the APD and surface use plan of operations that address this unlikely event, as well as other job place-related safety measures required under federal and state law.	

#19

Resource	Comment Summary
<i>Surface water resources within the watershed</i>	Question accuracy, Figure 7 of the EA not described in text and not accurate see text on pg 1 of comment #1, 2,3.
Response: The maps depicting surface water resources have been properly labeled, and have been revised to show surface water resources and local wells at two different scales. Additionally, the well labeling on these maps has been revised to match the labeling in the Rio Grande Hydrogeologic Study.	

#21

Resource	Comment Summary
<i>Transportation/access</i>	Lacking in a range of alternatives. Transportation concerns related to public safety (school zones) not adequately analyzed in the current alternatives.
Response: The BLM has addressed transportation concerns under the resource areas which is had jurisdiction (specifically, air quality impacts from transportation vehicles were considered in Section 1.6). The BLM has communicated with Rio Grande County and the Town of Del Norte regarding safety concerns, and it is anticipated that those entities will address this issue under their specific jurisdictions.	

#22

Resource	Comment Summary
<i>Rio Grande County Land Use regulations</i>	This project is in violation of Rio Grande County Land Use regulations.
Response: The APD, Environmental Assessment, and decision by the BLM address federal regulation of a federally-managed resource. While the BLM strives to work cooperatively with other jurisdictions (state, county, etc.) for this project wherever possible, if there are contradictions between county or state jurisdictions and federal jurisdiction, the Supremacy Clause of the U.S. Constitution holds that the federal jurisdiction controls over state and county regulations.	

#23

Resource	Comment Summary
<i>Introduction</i>	Contradictory statements reduce dependence on foreign energy sources and to meet the demand for fossil fuel. American Petroleum Institute is lobbying Congress for permission to export natural gas since selling in European markets (versus domestic) would generate three times the profit, and in Asian markets six times the profit.
Response: Concerns regarding exportation of natural gas are outside the scope of the proposed action. The statement regarding energy independence was speculative considering the nature of this development and has been struck from the draft.	

#24

Resource	Comment Summary
<i>Air Quality</i>	Can the nearest APCD air monitors to the project site in Alamosa measure changes 30-miles away?
Response: The APCD air monitor data was included in the EA to provide best available data for a “hard look” analysis, as required under NEPA. While the APCD monitors in Alamosa cannot measure air quality impacts from the project directly, they do provide baseline data that is useful for understanding the context and trends for current air quality conditions in the project area. Similarly, the intensity of emissions that correlate to the monitored values provides a reasonable basis to contrast any potential air quality impacts that could arise over the duration of implementing the proposed action.	

#25

Resource	Comment Summary
<i>Project Planning</i>	Since there is no indication what “the life of the project” entails in terms of the end result that DAHC hopes for (and presumably describes somewhere, but not in this EA), then the BLM’s projection that GHG is highly speculative is in itself speculative.
Response: The project is described in chapters 1 and 2 of the document, and is based on a specific proposed action, not a particular desired result. All analysis is tied directly to that proposed action.	

#26

Resource	Comment Summary
<i>Project Planning</i>	What is the level of production, will there be a pipeline, will product be trucked out, what is the final production stage anticipated? Context and Intensity is not clear.
Response: See response to Comment 8 and the proposed action as defined in the EA. Due to the nature of this project, in the unlikely event of development beyond this wildcat well, additional NEPA analysis would be completed. This has also been addressed in the “Alternatives Considered but Eliminated from Detailed Analysis” section (2.2.3) of the revised document.	

#26

Resource	Comment Summary
<i>Project Planning</i>	The well casing depth is inadequate in the EA planning process and contradicts the Rio Grande County Hydrogeological Study of 2012. The BLM acknowledges the Rio Grande Hydrologic Study but does not demonstrate any substantive use of it. If BLM rejects this study, then it must refute it with substantive rationale and literature citation or with other documented expert opinion.
Response: The BLM does not refute the findings in the Rio Grande Hydrologic Study. The conditions of approval, provided to the public along with the EA, detail the BLM’s requirements for casing the well, including the conditions under which the BLM would require an intermediate string of casing between 1400’ and the bottom of the Conejos Formation. The BLM’s Onshore Order #2 provides requirements and standards for drilling; this includes a cementing and casing requirement for all usable water zones that would achieve the main recommendation of the Rio Grande Hydrogeologic Study, namely, the protection of the Conejos formation aquifer.	

#27

Resource	Comment Summary
<i>Soils</i>	Please provide facts in terms of accumulative disturbances and when minor becomes major. You are implying that soil disturbance per well will not increase, but in fact it could be an exponential progression and disrupt much more than the soil.
Response: The analysis has been edited to reflect the fact that additional development would require further NEPA analysis.	

#28

Resource	Comment Summary
<i>Water</i>	Questions the statement “the relationships between the two aquifers and between the aquifers and the surface water are not well defined.” Because they are defined in the Rio Grande Hydrogeological Study
Response: This statement has been revised in the document. While the general nature of the relationship between the two aquifers and the surface waters is understood, the non-heterogeneous nature of the aquifers in the project area, according to the Rio Grande Hydrogeologic Study, means those local conditions are not well characterized.	

#29

Resource	Comment Summary
<i>NEPA Adequacy Scoping</i>	The BLM did not address scoping comments in preparation of the EA. The BLM received “42 written comments” on page 7 of the draft EA. The EA does not specifically articulate the significant issues used in this analysis. How did the BLM dutifully embrace and actually use public input on this project? The BLM must explain why each issue statement submitted during scoping was dismissed.
Response: The BLM reviewed all scoping comments and considered them in the preparation of the Environmental Assessment. Per the BLM NEPA Handbook, Section 8.3.3, Scoping and Issues, we provided a summary of scoping comments in the EA (section 1.6).	

#30

Resource	Comment Summary
<i>NEPA Adequacy</i>	EA failed to define acronyms and terms. The EA is not written in plain English as described in Plain Writing Act 2010.
Response: The EA has been edited to define acronyms and terms the public requested to be clarified.	

#31

Resource	Comment Summary
<i>Proposed Action</i>	Scientific literature citations are missing many citations. Impossible to verify that literature that was actually used that is relevant to the analysis, that it is appropriate and interpreted correctly.
Response: The EA has been edited to ensure that all citations are included. We apologize for the editing error at the draft stage.	

#32

Resource	Comment Summary
<i>NEPA Adequacy</i>	Proposed action is not specifically labeled and succinctly stated as such in the EA?
Response: The Proposed Action is defined in section 2.2.1 of the document.	

#33

Resource	Comment Summary
<i>NEPA Adequacy RMP</i>	The RMP that is being tiered to is 21 years old and does not analyze fracking. There is no other broad programmatic-scale O&G effects analysis for this EA to tier to or to reference in order to dismiss project-level effects. The RMP does not conduct any site-specific effects analysis. Effects have not been substantially analyzed in the EA. This is a significant oversight and it is in conflict with the CEQ regulations addressing effects and cumulative impacts.
Response: The San Luis Resource Area plan was finalized in September 1991. Despite the relative age of the document, the Resource Area as a whole is well within the reasonable foreseeable development scenario contemplated in the document, which was 10 APDs <u>per year</u> . Additionally, the RMP included an appendix dedicated to fluid minerals management. This appendix includes an in-depth discussion regarding oil and gas development in general, the difference between exploration and production scenarios, hydraulic fracturing, and many other topics germane to the RMP decision and this analysis.	

#34

Resource	Comment Summary
<i>NEPA Adequacy</i>	Figures/images are mislabeled or not labeled at all.
Response: The document has been revised to correctly identify and label images, tables, and maps. We apologize for the errors.	

#35

Resource	Comment Summary
<i>NEPA Adequacy Cumulative</i>	The EA is silent on cumulative effects discussion for both alternatives.
Response: The document contains cumulative effects analysis for both alternatives under each resource area.	

#36

Resource	Comment Summary
<i>NEPA Adequacy</i>	The EA is silent on connected actions to the proposed action (i.e., water acquisition, transportation, and storage; fracking chemical transport, storage and disposal; production fluid storage, transportation and disposal; etc.) Connected actions related to chemical compounds and

	dust released into the air potentially affect air quality for subdivision, the town of Del Norte, Rio Grande County and beyond where appropriate.
Response: Please see response to comment #4, addressing concerns about scope of the proposed action and scope of analysis.	

#37

Resource	Comment Summary
<i>NEPA Adequacy</i>	There is no spatial context for the effects analysis in the EA.
Response: Chapter 2 of the document provides a description of the proposed action, including a physical description of the area where the action is proposed to take place, the details of the project, and maps of the area.	

#38

Resource	Comment Summary
<i>Vegetation</i>	The vegetation at the proposed well site is incorrect for new botanical survey results.
Response: The document has been updated to reflect the new data provided.	

#39

Resource	Comment Summary
<i>NEPA Adequacy</i>	CEQ requires that the List of Preparers identify their qualifications. Chapter 4 issues.
Response: CEQ Regulation 1502.17, requiring a List of Preparers, applies to Environmental Impact Statements. The document provides a list of resource specialists that is sufficient for this document.	

#40

Resource	Comment Summary
<i>Cultural and Historic Resources</i>	Consideration of the potential for significant negative impacts on cultural resources and unique heritage sites lying within the San Francisco Creek valley has been insufficient and it deserves further in depth analysis.
Response: The analysis in the document regarding cultural resources is tied directly to the proposed action and complies with BLM's responsibilities under the National Historic Preservation Act. Additionally, the State of Colorado Historic Preservation Office concurred with the BLM's determination regarding the site.	

#41

Resource	Comment Summary
<i>Public Health and Safety</i>	No reference in the EA regarding radon releases.
Response: The BLM does not analyze the potential of radon releases from oil and gas operations.	

#42

Resource	Comment Summary
<i>Wildlife</i>	CPW recommend BLM analyze the potential impacts to wildlife from long term production and

	maintenance at the proposed location, and the potential wildlife impacts from increased traffic to extend beyond the immediate vicinity of the pad.
Response: While analyzing “long-term production” is beyond the purpose and need of this NEPA document, this document was revised to address CPW’s concerns regarding traffic beyond the immediate vicinity of the proposed drilling location. Please see section 3.3 for details.	

#43

Resource	Comment Summary
<i>Wildlife</i>	According to the late Dr. Herman Deitrich who ran the wildlife rehabilitation center at the end of the road Mountain Rattler and Kangaroo Rats are frequent in the area.
Response: The BLM concurs with the presence of Kangaroo Rats and rattlesnakes in the general vicinity of the project area. As stated in the cumulative impacts section of the Terrestrial Wildlife Section (3.3.4), “With the implementation of the proposed mitigation measures, operational requirements, and BMPs, it is anticipated that environmental consequences of displacement of wildlife species and loss of habitat would affect some individuals, but not impact the continued viability of any species.”	

#44

Resource	Comment Summary
<i>Geology/Seismology</i>	The EA did not analyze the risk of earthquakes generated by fracking.
Response: Earthquakes caused by hydraulic fracturing are not a reasonably foreseeable event from this proposed action.	