BLM

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

Environmental Assessment

Carrizo Sonic Star 1–12–8–60 APD

December, 2015

PREPARING OFFICE

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Bureau of Land Management
Royal Gorge Field Office
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Environmental Assessment
Carrizo Sonic Star 1–12–8–60 APD

DOI-BLM-CO-F02-2015-0022 EA

Prepared by
U.S. Department of the Interior
Bureau of Land Management
Royal Gorge Field Office
Canon City, CO

December, 2015

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Chapter 1 Introduction

1.1. Identifying Information:

1.1.1. Title, EA number, and type of project:

Carrizo Sonic Star 1–12–8–60 APD

DOI-BLM-CO-F020-2015-0022 EA

1.1.2. Location of Proposed Action:

6th PM, 8N 60W S11

1.1.3. Name and Location of Preparing Office:

Royal Gorge Field Office

1.1.4. Identify the Subject Function Code, Lease, Serial, or Case File Number:

COC 71628

1.1.5. Applicant Name:

Carrizo Niobrara LLC

1.2. Introduction and Background

This EA has been prepared by the BLM to analyze environmental impacts of the construction of a well pad and access road in order to drill a horizontal oil well in which the surface location is on private surface estate/over private mineral estate (fee/fee), to develop nearby federal minerals. The project is located on previously disturbed (presumably for dryland farming) land, which has since been reclaimed. It is now native and non native shortgrass prairie in Northeast Weld County approximately 2.5 miles southeast of the town of Keota, Colorado. The federal mineral estate that will be accessed by the wells is leased and subject to oil and gas development. All surface activities related to these actions will take place on privately owned surface over federal minerals (off lease), no surface disturbance will take place on federal land.

1.3. Purpose and Need

The purpose of the action is to provide the applicant the opportunity to develop their lease for the production of oil and gas. Production will specifically target petroleum resources in the Niobrara/Codell formation underlying the federal lease. The need for the action is to develop oil and gas resources on Federal Lease COC71628 consistent with existing Federal lease rights

provided for in the Mineral Leasing Act of 1920, as amended, and consistent with the fluid minerals provision in the Northeast RMP as amended, and Federal Oil and Gas onshore orders.

1.4. Decision to be Made

The BLM will decide whether to approve the Sonic Star 1–12–8–60 Application for Permit to Drill (APD) based on the analysis contained in this Environmental Assessment (EA). This EA will analyze the proposed action; to construct one well pad, install production facilities, and drill, complete and produce one horizontal oil well to develop federal minerals from a private surface located off federal lease above private minerals(fee/fee/fed). Access to the proposed project would be from Weld County Road 390. The finding associated with this EA may not constitute the final approval for the proposed action.

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: Northeast Resource Area Plan and Record of Decision as amended by the Colorado Oil and Gas Final EIS and Record of Decision (ROD)
>
> Date Approved: 09/16/86 amended 12/06/91
>
> Decision Number/Page: O&G Resources, Issue 21
>
> Decision Language: "These 210,410 acres of surface and subsurface may be leased and developed for oil and gas with the standard stipulations included in the leases and standard site-specific stipulations included in any use authorization."

1.6. Scoping, Public Involvement and Issues

NEPA regulations (40 CFR §1500-1508) require that the BLM use a scoping process to identify potential significant issues in preparation for impact analysis. The principal goals of scoping are to allow public participation to identify issues, concerns, and potential impacts that require detailed analysis.

Persons/Public/Agencies Consulted: Internal scoping conducted by the RGFO Interdisciplinary Team (ID Team) and external scoping by posting this project on the Royal Gorge Field Office NEPA website, was the primary mechanism used by the BLM to initially identify issues.

Chapter 2 Proposed Action and Alternatives

2.1. Description of the Proposed Action

The BLM RGFO has received one Application for Permit to Drill (APD), proposing drilling, completion and operation of one horizontal federal oil well. An access road and well pad will be constructed on fee surface over fee minerals (adjacent to the federal lease) in order to drill, complete and operate the well. Since all surface activity and related disturbance is taking place on private surface, BLM has limited authority over the actions that take place on the surface, including authority to impose mitigation measures (as COAs to the approved APD) pertaining to the surface management of the well site. However, BLM will analyze the impacts to applicable resources, including some that BLM has no authority to affect.

The general area description would be defined as previously disturbed CRP (shortgrass prairie containing native and non-native species) and actively grazed rangeland located in the northeastern plains of Colorado, used primarily for livestock production and oil and gas development. There is no public access to the proposed well site, however it is located adjacent to Pawnee National Grassland surface. Extensive oil and gas development has occurred in the area, mostly on private (fee) surface and private (fee) mineral estate.

2.2. Alternatives Analyzed in Detail

Proposed Action

The proposed well pad will have a maximum cut of approximately 5 feet with a maximum fill of approximately 1 foot resulting in approximately 7,982 cu yards of excess material, plus 1,167 cu yards of topsoil which will be stripped from the top 6” of the surface and stockpiled before construction, for use during reclamation. Construction of the well pad would result in approximately 4.5 acres of new surface disturbance, which would be reduced to approximately 3 acres after successful interim reclamation.

The proposed access road will be approximately 675 feet in length, 30 feet wide. This will result in approximately .5 acre disturbance. There will be no significant cuts or fills required to construct the road, except for fill necessary to protect an NRHP eligible abandoned railroad grade which the proposed access road will cross. The road will be surfaced with gravel road base.

100% of the water used for the entire project will be obtained from wells designated by the State of Colorado as non-tributary to the South Platte River, and will be transported via truck and/or temporary hand laid surface pipeline. These sources are operated by Grassland Water Solutions (various wells producing from the Upper Crow Creek designated groundwater basin, which is designated non-tributary. The estimated water use is approximately 11.2 acre feet for the entire project.

Stormwater/erosion control measures will be taken to stabilize the site. The proposed drilling and completion of the well will utilize closed a closed loop mud system, utilizing freshwater based mud. The well will be drilled horizontally to a total measured depth (TMD) of approximately 13,400 feet, and completed using hydraulic fracturing techniques. All liquids will be stored in tanks on the pad during drilling and completion operations. No pits will be utilized on location. Completion fluids will be flowed back to enclosed steel tanks. Drill cuttings will be transported off site and disposed of in a state approved disposal facility. All other waste materials produced

during drilling, completion and operation of the well (completion fluids, produced water, sewage and garbage) will be hauled off site and recycled or disposed of at applicable state permitted commercial treatment/disposal facilities. The duration of drilling is estimated to be 14 days.

Interim reclamation of the pad will begin following completion of the well. Interim reclamation will consist of re-contouring of subsoil and spreading of topsoil, and reseeding over the areas of the pad not needed for production.

Final reclamation of each project will begin following well plugging. Final reclamation will be completed in accordance with the surface owner preferences and as required by the state of Colorado, who has the authority with surface locations on Fee/Fee locations.

The Application for Permit to Drill (APD) for each new well includes a detailed and specific drilling program and multi-point surface operations plan (including detailed construction and reclamation plans.) The proposed action would be implemented consistent with the operations plans provided with approved permit, with Conditions Of Approval (COAs), Onshore Oil and Gas Orders, and 43 CFR §3100.

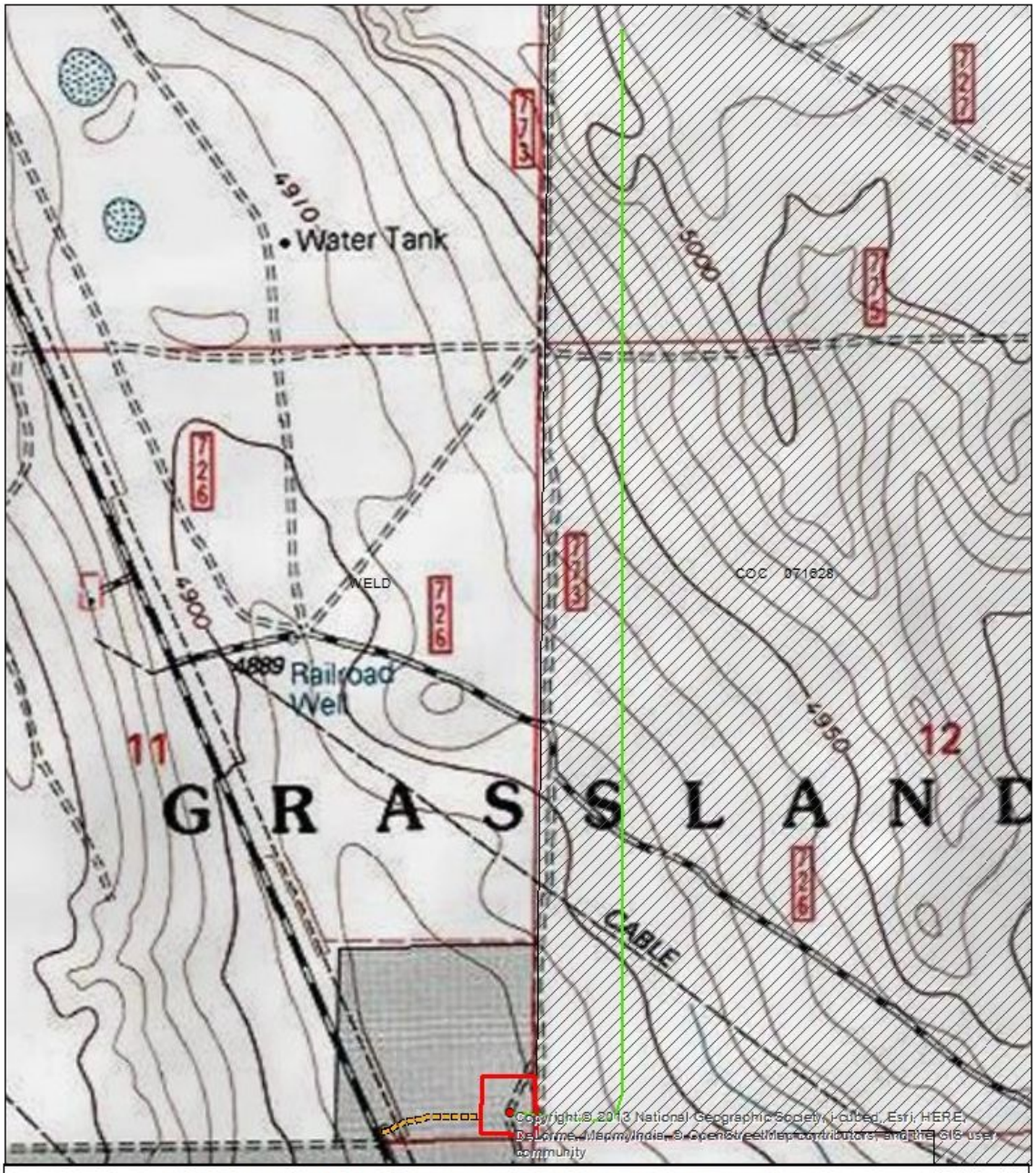
OVERVIEW MAP OF SONIC STAR 1-12-8-60 APD

DOI-BLM-CO-F020-2015-0022 EA

- Proposed Pad
- Proposed Access Road
- Proposed Well SHL
- Approx. Prop. Wellbore Trajectory
- Federal Lease COC 071628

0 1.25 2.5 5 7.5 10 Miles

NOTE TO MAP USERS
No warrantee is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of the data layers shown on this map. The official land records of the data providers should be checked or current status on any specific tract of land.



PROJECT MAP OF SONIC STAR 1-12-8-60 APD

DOI-BLM-CO-F020-2015-0022 EA

Proposed Pad
Proposed Access Road
Proposed Well SHL
Approx. Prop. Wellbore Trajectory
Federal Lease COC 071628

0 0.05 0.1 0.2 0.3 0.4 Miles

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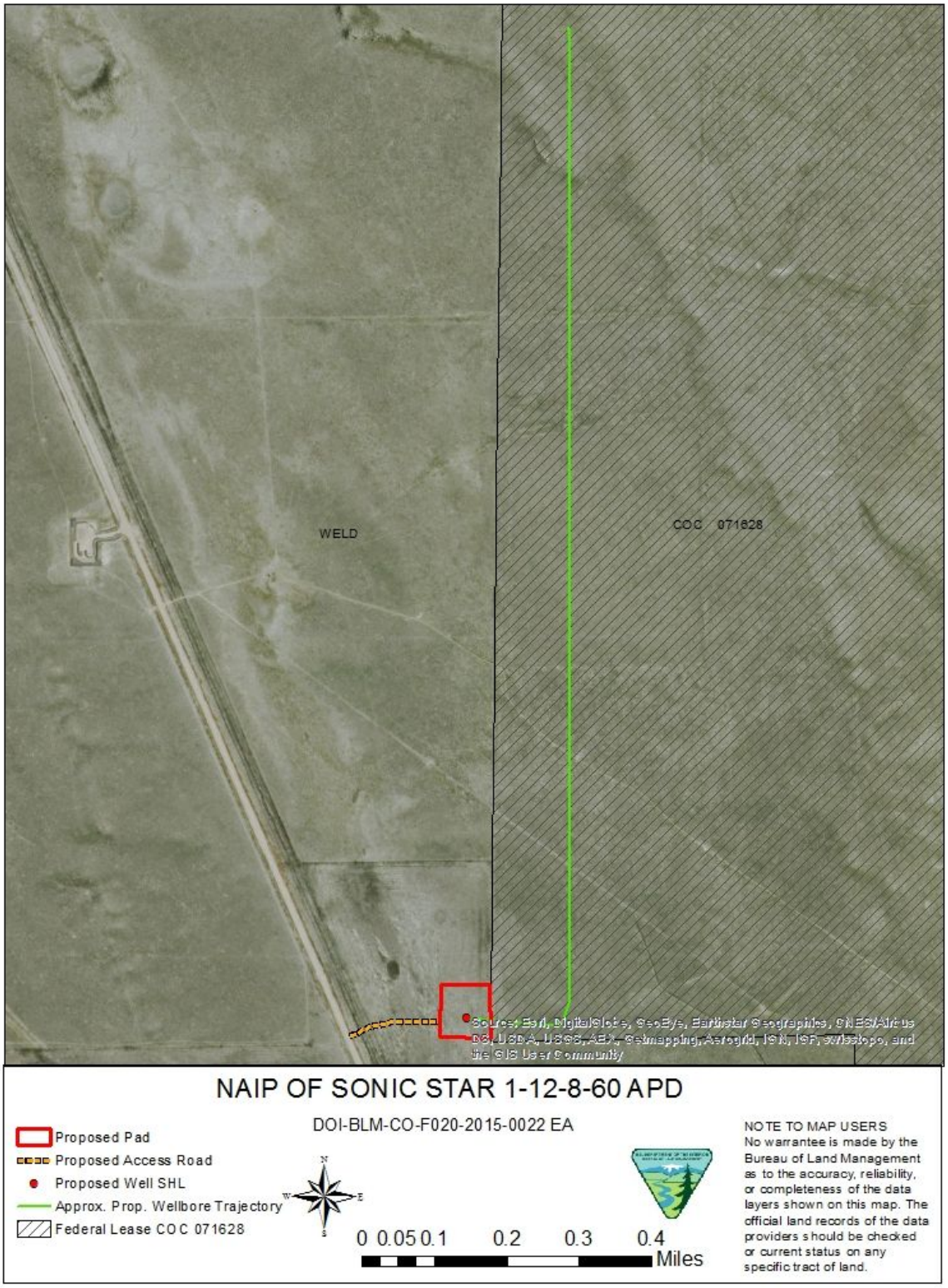
WELD
COC 071628
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
NAIP OF SONIC STAR 1-12-8-60 APD
DOI-BLM-CO-F020-2015-0022 EA
Proposed Pad
Proposed Access Road
Proposed Well SHL
Approx. Prop. Wellbore Trajectory
Federal Lease COC 071628
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Miles
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2.2.1. No Action Alternative

The proposed action involves federal subsurface minerals that are encumbered with a federal oil and gas lease, which grant 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. The no action alternative constitutes denial of the APD associated with the proposed action. Although BLM does not have jurisdiction over the private surface off lease, and cannot prevent certain activities from taking place on this surface, the operator has not stated that they are planning on drilling any fee wells from this location, so it is assumed that if the APD is denied none of the associated proposed surface activities would occur.

2.3. Alternatives Considered

2.3.1. Alternatives Considered, but not Analyzed in Detail

Other alternatives were not considered due to the proposed project being a non-discretionary action being proposed on private surface over private mineral estate.

Chapter 3 Affected Environment and Effects

3.1. Introduction

3.1.1. Interdisciplinary Team Review

The following table 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 Ty Webb, Chad Meister, Forrest Cook	CM, 12/15/15	See Affected Environment
Geology/Minerals Stephanie Carter, Melissa Smeins	MJS, 10/9/ 2015	See Affected Environment
Soils Aaron Richter	AR 12/15/15	See Affected Environment
Water Quality Surface and Ground John Smeins, Aaron Richter	AR 12/15/15	See Affected Environment
Invasive Plants John Lamman, Aaron Richter	AR 12/15/15	Project is located on private surface over private minerals off lease (fee/fee/fed), therefore BLM does not have authority over invasive species control on the location, however the State of Colorado requires operators to control list A and B noxious weeds on oil and gas locations.
Threatened, Endangered and Proposed Species	LD 10/29/15	See analysis below
Vegetation John Lamman	JL, 12/15/15	See affected environment
Wetlands and Riparian Dave Gilbert	DG 8/28/15	The proposed activity is within uplands.
Wildlife Aquatic Dave Gilbert	DG 8/28/15	The proposed activity is within uplands.
Sensitive Species	LD 10/29/15	See analysis below
Terrestrial Wildlife & Migratory Birds	LD 10/29/15	See analysis below
Cultural Resources Monica Weimer	MMW, 8/27/15	See affected environment.
Native American Religious Concerns Monica Weimer	MMW, 8/27/15	The BLM conducted a consultation with 17 tribes (CR-RG-14-34 NA), and none identified properties of traditional religious or cultural significance in the APE.
Economics Aaron Richter	AR, 12/12/15	Economic impacts would include a slight increase in royalties to the federal and state governments and severance taxes to local governments, and incrementally adding demand related to the oil and gas and service support industry in the region

Paleontology Melissa Smeins, Stephanie Carter	MJS, 10/9/ 2015	See affected environment
Visual Resources Linda Skinner	KL, 11/9/2015	See affected environment
Environmental Justice Martin Weimer		The proposed action affects areas that are rural in nature. The land adjacent to these parcels is mixed short grass prairie and farmland, as a result, there are no minority or low-income populations in or near the project area. As such, the proposal will not have a disproportionately high or adverse environmental effect on minority or low-income populations.
Wastes Hazardous or Solid Stephanie Carter	MJS, 10/9/ 2015	See Wastes, Hazardous or Solid section
Recreation Linda Skinner	KL, 11/9/2015	No public access or public surface present.
Farmlands Prime and Unique Jeff Williams, Chris Cloninger, John Lamman, Aaron Richter	AR, 12/15/15	A portion of the project is located on prime farmlands if irrigated. The project area is not irrigated.
Lands and Realty Steve Craddock, Vera Matthews	AR 11/17/14	N/A, Private surface.
Wilderness, WSAs, ACECs, Wild & Scenic Rivers Linda Skinner	KL, 11/9/2015	No Wilderness, WSA, ACEC, or Wild &Scenic Rivers present
Wilderness Characteristics Linda Skinner	KL, 11/9/2015	No wilderness characteristics areas present.
Range Management John Lamman	JL, 12/15/15	Surface estate is private
Forest Management Ken Reed	AR	N/A, private surface.
Cadastral Survey Jeff Covington	AR	Chain of Survey on file in project folder.
Noise Martin Weimer		The project area is located in farm and grasslands. Certain levels of noise are associated with drilling operations, these include drill rig operation, compressors/generators and general machine and vehicle operation. Such noises could have the effect of driving away wildlife. These impacts are temporary and terminate when drilling operations are complete.
Fire Ty Webb	AR	N/A, private surface.
Law Enforcement Steve Cunningham	AR	N/A, private surface.

The affected resources brought forward for analysis include:

- Air Quality
- Geology/Minerals
- Soils
- Water Quality
- Threatened Endangered and Proposed Species
- Vegetation
- Sensitive Species
- Terrestrial Wildlife & Migratory Birds
- Cultural Resources
- Visual Resources
- Paleontology
- Wastes, Hazardous or Solid

3.2. Physical Resources

3.2.1. Air Quality and Climate

Affected Environment:

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), codified at 40 Code of Federal Regulations (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 and 2.5 microns (PM10 and PM2.5, respectively), ozone (O3), and nitrogen dioxide (NO2). Ambient air quality standards must not be exceeded in areas where the general public has access.

The CAA established two types of NAAQS:

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

Secondary standards: – Secondary standards set limits 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 hospital admissions are evaluated, and can revise any NAAQS if the data supports a revision. The Colorado Air Pollution Control Commission can establish state ambient air quality standards for any criteria pollutant. Any state standard must be at least as stringent as the federal standards. Table 3-1 lists the federal and Colorado ambient air quality standards.

Pollutant [final rule citation]		Standard Type	Averaging Period	Level a	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		Primary	8-hour	9 ppm	Not to be exceeded more than once per year c
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		Primary and secondary	Rolling 3-month average	0.15 µg/m3	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		Primary and secondary	Annual	53 ppb	Annual mean
Ozone [73 FR 16436, Mar 27, 2008]		Primary and secondary	8-hour	0.075 ppm d	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particulate Matter [73 FR 3086, Jan 15, 2013]	PM2.5	Primary	Annual	12 µg/m3	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m3	Annual mean, averaged over 3 years
		Primary and secondary	24-hour	35 µg/m3	98th percentile, averaged over 3 years
	PM10	Primary and secondary	24-hour	150 µg/m3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010]		Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[38 FR 25678, Sept 14, 1973]		Secondary	3-hour	0.5 ppm b	Not to be exceeded more than once per year

a mg/m3 = milligrams per cubic meter, µg/m3 = micrograms per cubic meter, ppb = parts per billion, ppm = parts per million.

b Colorado Ambient Air Quality Standard for 3-hour SO2 is 0.267 ppm.

Source: National – 40 CFR 50, Colorado – 5 CCR 1001-14

c 8-hr CO standard is based on the second high

d On October 1, 2015 EPA proposed a new ozone standard of 70 ppb.

For areas that do not meet the NAAQS (these are designated by EPA as nonattainment areas), the CAA establishes timetables for each region to achieve attainment of the NAAQS. The State (Colorado Department of Public Health and Environment [CDPHE]) must prepare a State Implementation Plan (SIP), which documents how the region will reach attainment by the required date. A SIP includes inventories of emissions within the area and establishes emission budgets (targets) and emission control programs that are designed to bring the area into compliance with the NAAQS. In maintenance areas (nonattainment areas that have achieved attainment), SIPs document how the State intends to maintain compliance with NAAQS.

In addition to the criteria pollutants, regulations also exist to control the release of hazardous air pollutants (HAPs). HAPs are chemicals that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. EPA currently lists 188 identified compounds as hazardous air pollutants, some of which can be emitted from oil and gas development operations, such as benzene, toluene, and

formaldehyde. Ambient air quality standards for HAPs do not exist; rather these emissions are regulated by the source type, or specific industrial sector responsible for the emissions.

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)].

Section 176(c) of the CAA prohibits Federal entities from taking actions in non-attainment or maintenance areas that do not "conform" to the SIP. The purpose of this conformity requirement is to ensure that Federal activities: (1) do not interfere with the budgets in the SIPs; (2) do not cause or contribute to new violations of the NAAQS; and (3) do not impede the ability to attain or maintain the NAAQS. To implement CAA Section 176(c), EPA issued the General Conformity Rule (40 CFR Part 93, Subpart B), which applies to all Federal actions not funded under U.S.C. Title 23 or the Federal Transit Act (BLM actions are not funded by U.S.C. Title 23 or the Federal Transit Act). The General Conformity Rule established emissions thresholds (40 CFR 93.153), known as *de minimis* levels, for use in evaluating the conformity of a federal action. If the net emissions increases due to the action are less than these thresholds, the project is presumed to conform and no further conformity evaluation is required. If the emissions increases exceed any of these thresholds, a conformity determination is required. The conformity determination can entail air quality modeling studies, consultation with EPA and state air quality agencies, and commitments to revise the SIP or to implement measures to mitigate air quality impacts. The BLM, as the federal entity with jurisdiction for the approval of the APD(s), must demonstrate that the proposed action meets the requirements of the General Conformity rule.

The proposed Sonic Star well is located within the EPA-designated Denver-Boulder-Greeley-Fort Collins ozone nonattainment area. Because the General Conformity rule applies to actions in nonattainment or maintenance areas, this well is subject to the general conformity requirements. Figure 3-1 depicts the general location with respect to the nonattainment area boundaries and also provides context for the current and historical oil and gas development within the area, with the red dots indicating existing well locations.

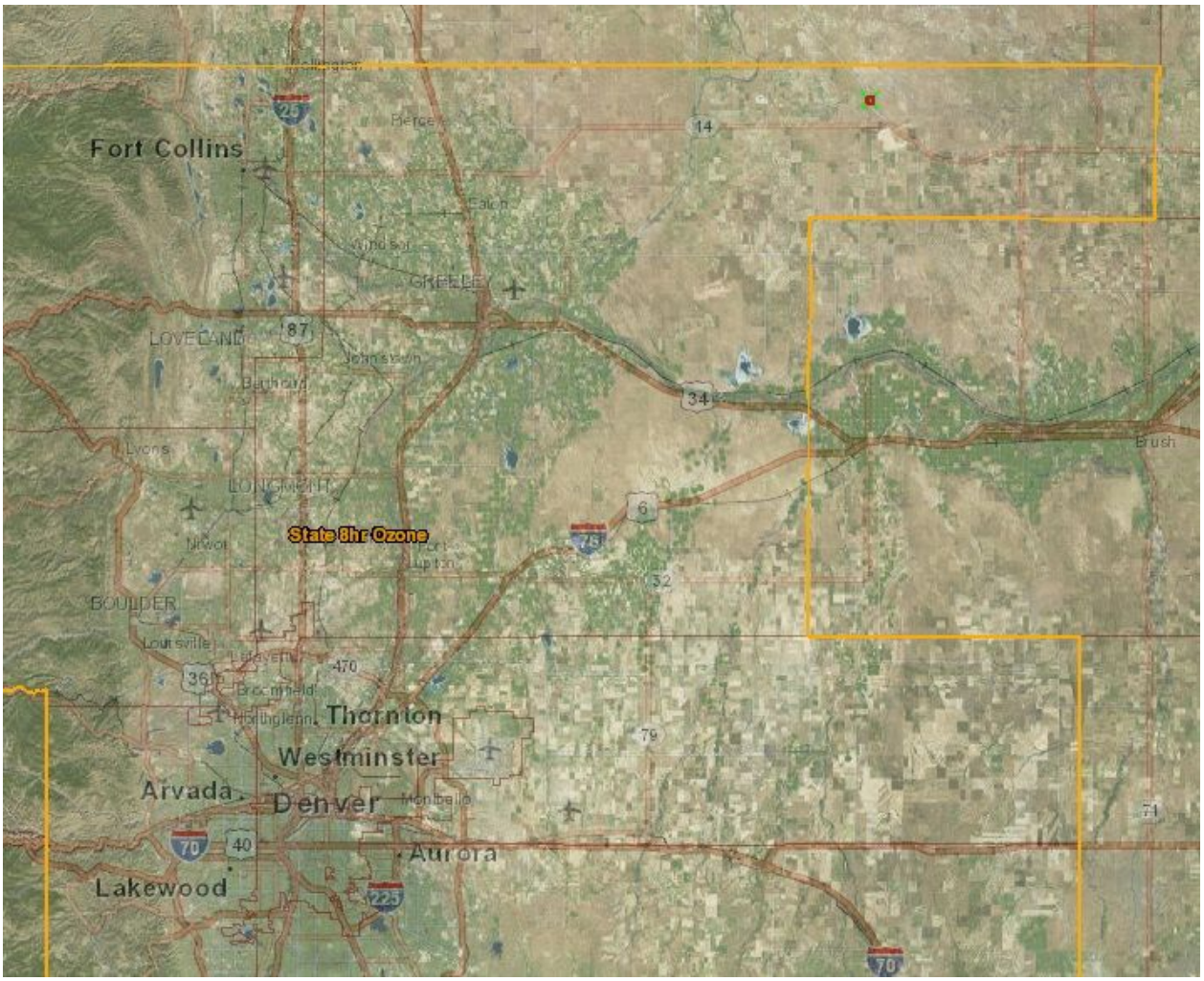


Figure 3.1. Well location and Ozone Nonattainment Area & Area O&G Development

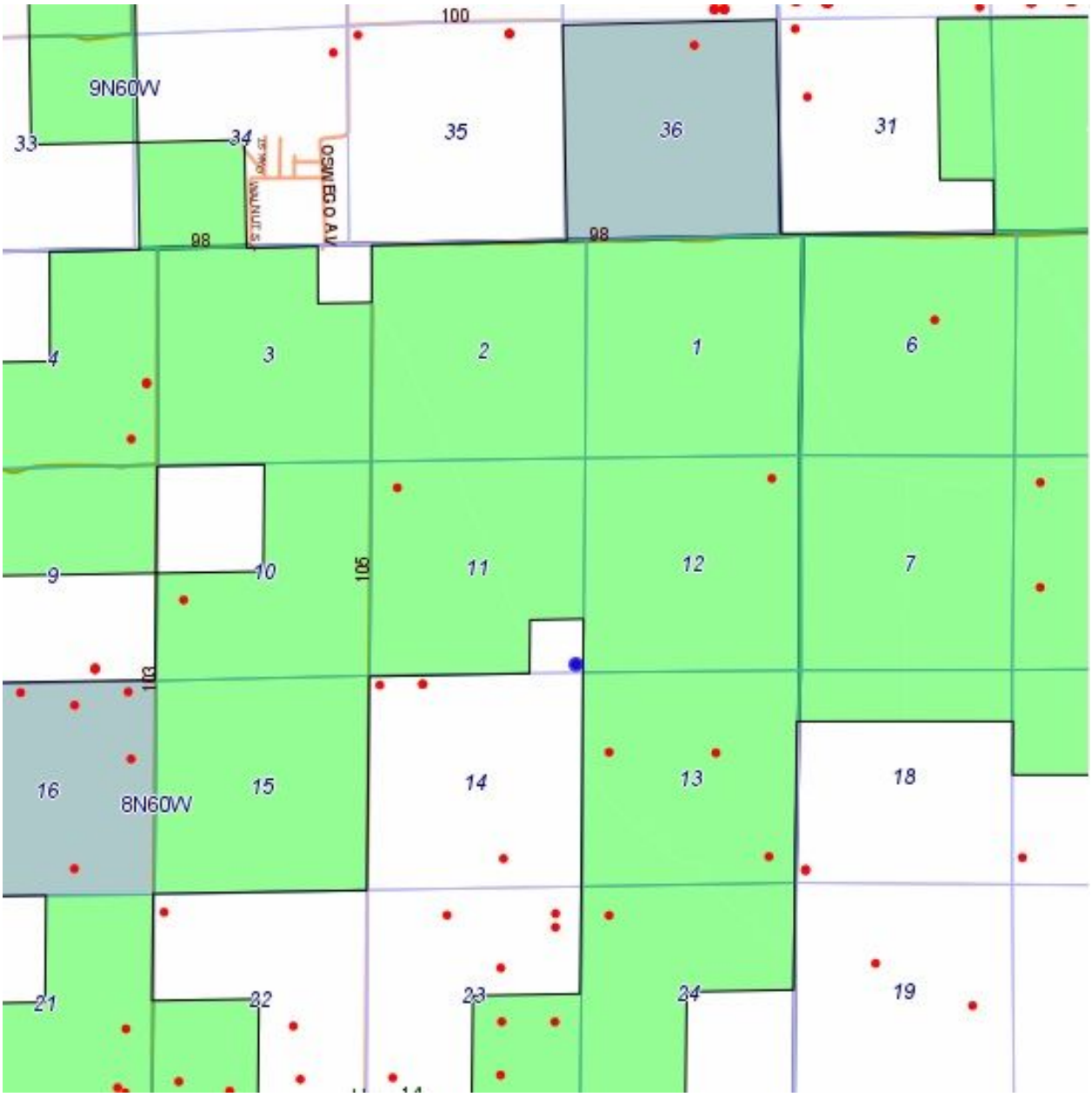


Figure 3.2.

The Prevention of Significant Deterioration (PSD) provision of the CAA established Class I areas in which very little degradation of air quality is allowed (e.g., national parks and large wilderness areas) and Class II areas (all non-Class I areas). The PSD Class II designation allows for moderate degradation of air quality within certain limits above baseline air quality. In addition to the criteria PSD pollutants, Class I & II areas may also be analyzed for Air Quality Related Values (AQRVs). AQRVs are metrics for atmospheric phenomenon like visibility and deposition impacts that may adversely affect specific scenic, cultural, biological, physical, ecological, or recreational resources. Visibility changes can occur when excessive air contaminates (mostly fine particles) scatter light such that the background scenery becomes hazy. Deposition (via wet and dry mechanical processes) can cause excess nutrient loading in native soils and acidification of the landscape, which can lead to declining buffering capacity changes in sensitive stream and lake

water chemistries (commonly referred to as acid neutralization change (ANC)). The sonic star pad is within an area designated as Class II. The closest Class I area to the proposed well site locations is Rocky Mountain National Park, which lies approximately 125 km to the west.

Land Use in the Project Region: The vicinity of the Project Area (northern Weld County) is predominantly used for agriculture. Approximately 75% of the available land area of Weld County is linked to the agricultural sector of the economy in one form or another. Oil and gas development is another major economic driver for the area, and Weld County has more than 25,000 active wells within its boundaries. The population density of Weld County within the vicinity of the Project Area is generally dispersed, with less than 25 people per square mile. Activities occurring within the area that affect air quality include exhaust emission from cars, drilling rigs, agricultural equipment, and other vehicles, and oil and gas development activities, as well as fugitive dust from roads, agriculture, and energy development.

Meteorology in the Project Region: Mean temperatures in the area range from 15.6 degrees Fahrenheit (°F) in January to 88.7° F in July. The area receives average annual precipitation of approximately 14.22 inches. Frequent winds in the area and a lack of complex topographical features provide for excellent dispersion characteristics for anthropogenic emissions within the region.

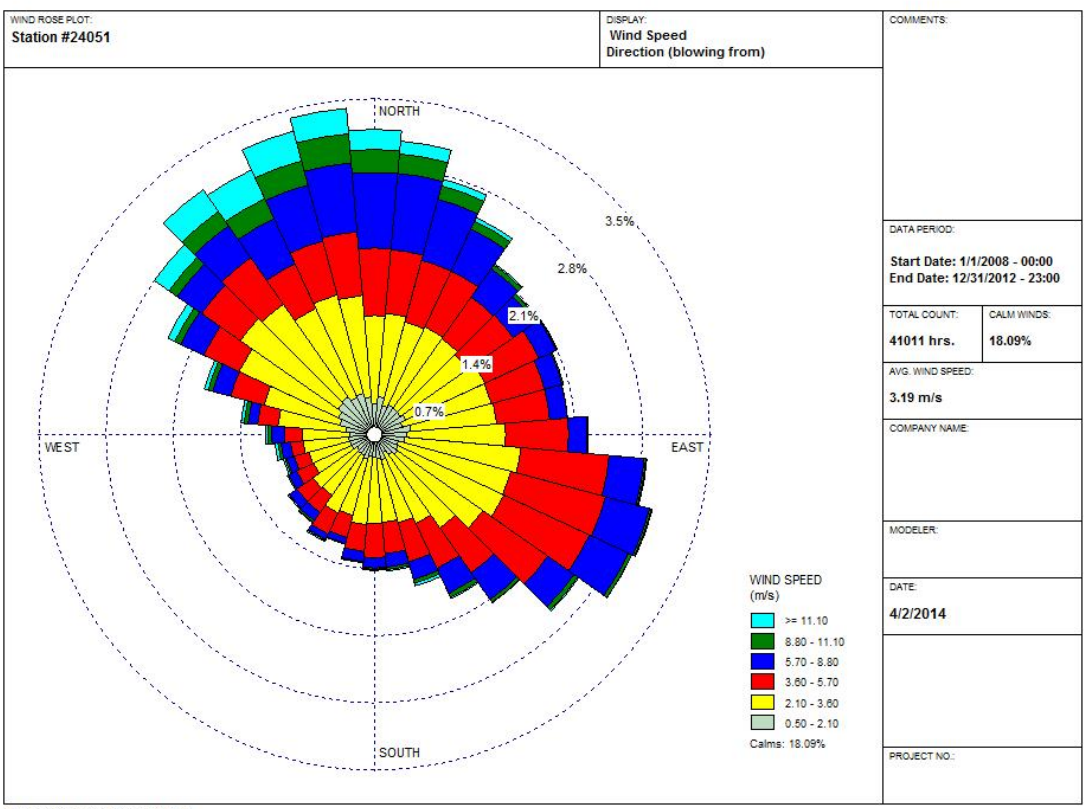


Figure 3.3. Project Area Wind Rose

Existing Air Quality Measured in the Region and County Emissions: The Air Pollution Control Division (APCD) of the Colorado Department of Public Health and Environment measures ambient air quality at a number of locations throughout the state. The nearest APCD air monitors to the project are the Weld County West Annex (CO), County Tower (O3), and Hospital (PM10 and PM2.5) sites located in Greeley, and one site in Briggsdale (O3). Table 3-2 provides the measured concentrations of criteria pollutants at these monitors for the most recent three years. There are no lead, NO2, or SO2 monitors near the project area. Table 3-2 indicates that no violations of the NAAQS have occurred in the project region in the last three years, (O3 3 yr. ave. = 74.6 ppb). Table 3-3 provides a look at the corresponding emissions levels within Weld County that may contribute to the monitored air quality data. The EPA compiles the National Emissions Inventory (NEI) as a triennial report, with the last available compilation year being 2011.

Table 3-2: Measured Ambient Concentrations in the Region

Monitor Location	Pollutant (Averaging Period – Unit, Form)	Measured Concentration		
		2012	2013	2014
Weld County West Annex, Greeley	CO (1 Hour – ppm, maximum)	3.2	2.6	2.7
	CO (8 Hour – ppm, maximum)	1.6	1.4	1.7
Weld County Tower, Greeley	O3 (8 Hour – ppm, 4th maximum)	0.074	0.073	0.070
Weld County Health Dept. (Hospital), Greeley	PM10 (24 Hour - µg/m3, maximum)	91	47	60
	PM2.5 (24 Hour - µg/m3, 98th percentile)	32	18	32
	PM2.5 (Annual - µg/m3, annual mean)	7.9	7	8.1

Table 3–3: Weld County NEI Data

Weld	PM10	PM2.5	VOC	CO	NOX	SO2	CO2	CH4	N2O	NH3	HAPs
Agriculture	9,082.1	1,865.76	.	.	.	.	.	.	.	15,762.85	.
Biogenics	.	.	21,009.7	4,785.29	1,977.03	.	.	.	.	.	4,285.85
Bulk Gasoline Terminals	.	.	201.55	3.72	2.22	.	.	.	.	.	3.01
Commercial Cooking	57.41	53.25	7.72	22.07	.	.	.	.	.	.	2.96
Dust	14,441.01	1,746.99	.	.	.	.	.	.	.	.	.
Fires	1,143.49	662.71	912.93	7,256.49	236.89	113.98	31,689.18	125.99	.	42.12	333.41
Fuel Comb	755.03	751.5	2,716.57	10,024.4	7,566.29	118.99	.	.	.	172.3	485.6
Gas Stations	.	.	688.37	.	.	.	.	.	.	.	12.14
Industrial Processes	1,890.59	646.6	105,039.54	4,616.66	7,534.01	295.91	.	.	.	.	535.53
Miscellaneous	.	.	158.17	.	.	.	.	.	.	.	11.66
Mobile	457.31	383.81	3,743.02	41,484.96	8,320.49	43.51	1,750,627.	140.48	59.45	103.	940.11
Solvent	22.41	18.7	3,069.71	7.47	18.58	.	.	.	.	.	1,258.83
Waste Disposal	110.34	64.94	170.21	21.16	7.51	2.13	.	.	.	.	16.77
Sum Totals:	**27,959.7**	**6,194.28**	**137,717.5**	**68,222.23**	**25,663.02**	**574.52**	**1,782,316.18**	**266.48**	**59.45**	**16,080.26**	**7,885.87**

Source: EPA NEI 2011

There is broad scientific consensus that humans are changing the chemical composition of Earth's atmosphere. Activities such as fossil fuel combustion, deforestation, and other changes in land use are resulting in the accumulation of trace greenhouse gases (GHGs) such as carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and several industrial gases in the Earth's atmosphere. An increase in GHG emissions is said to result in an increase in the earth's average surface temperature, primarily by trapping and thus decreasing the amount of heat energy radiated by the Earth back into space. The phenomenon is commonly referred to as global warming. Global warming is expected in turn, to affect weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, which is collectively referred to as climate change. The Intergovernmental Panel on Climate Change (IPCC) has predicted that the average global temperature rise between 1990 and 2100 could be as great as 5.8°C (10.4°F), which could have massive deleterious impacts on the natural and human environments. Although GHG levels have varied for millennia (along with corresponding variations in climatic

conditions), industrialization and the burning of fossil carbon fuel sources have caused GHG concentrations to increase measurably, from approximately 280 ppm in 1750 to 400 ppm in 2014 (as of April). The rate of change has also been increasing as more industrialization and population growth is occurring around the globe. This fact is demonstrated by data from the Mauna Loa CO2 monitor in Hawaii that documents atmospheric concentrations of CO2 going back to 1960, at which point the average annual CO2 concentration was recorded at approximately 317 ppm. The record shows that approximately 70% of the increases in atmospheric CO2 concentration since pre-industrial times occurred within the last 54 years.

Environmental Effects:

Proposed Action (Direct and Indirect Impacts): The proposed action will have a temporary negative impact to air quality which will mostly occur during the construction phase. Utilization of the access road, surface disturbance, and construction activities such as drilling, well completion, and equipment installation will all impact air quality through the generation of dust related to travel, transport, and general construction. This phase will 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 will 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 pad can be expected to produce fugitive emissions of liquid flashing gases, which can contains 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.

An emissions inventory (see table 3-4 below) has been compiled for the well pad based on the levels of activities required to implement the proposed action. 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: CO, NOX (includes NO2), PM2.5, PM10, SOX (as SO2), VOCs, HAPs, CO2, CH4, and 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. Potential emissions were calculated for the well assuming the minimum/basic legally required control measures, site specific voluntary operator controls, operational parameters, and equipment configurations data that was provided by the applicant.

Table 3-4: Sonic Star Emissions Inventory

Description	PM_{10}	$PM_{2.5}$	VOC	NO_X	CO	SO_X	CO_2	CH_4	N_2O	HAPs
Wind Erosion (tons/project)	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Off Road Exhaust (tons/project)	0.042	0.039	0.045	0.386	0.227	0.012	60.914	0.000	0.001	0.000
Off Road Fugitive Dust (tons/project)	0.206	0.131	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Drill Rig Exhaust (tons/project)	0.015	0.014	0.024	0.453	0.261	0.016	53.028	0.916	0.183	0.000
Completion Venting (tons/project)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Non Road Exhaust (tons/project)	0.079	0.077	0.127	2.400	1.383	0.086	280.745	30.329	6.065	0.000
Tank Battery Losses (tons/project)	0.000	0.000	0.201	0.000	0.000	0.000	0.000	0.000	0.000	0.017
Loadout Losses (tons/project)	0.000	0.000	0.142	0.000	0.000	0.000	0.000	0.000	0.000	0.016
Pneumatic Losses (tons/project)	0.000	0.000	0.516	0.000	0.000	0.000	0.000	1.434	0.000	0.045
Process Heaters (tons/project)	0.023	0.023	0.016	0.322	0.269	0.003	386.470	0.007	0.007	0.000
Stationary Engines (tons/project)	0.000	0.000	0.114	0.162	0.324	0.000	73.570	0.836	0.000	0.000

Component Fugitive Losses (tons/project)	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.040	0.000	0.001
On Road Fugitive Dust - Dirt Roads (tons/project)	1.834	0.184	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
On Road Exhaust (tons/project)	0.035	0.027	0.024	0.450	0.154	0.001	124.912	0.003	0.000	0.000
Totals	**2.24**	**0.495**	**1.223**	**4.173**	**2.618**	**0.118**	**979.639**	**33.565**	**6.256**	**0.079**

Ozone is noticeably absent from the EI due to the fact that it is not directly emitted like other criteria pollutants. Ozone is chemically formed in the atmosphere via interactions of oxides of nitrogen (NOX) and volatile organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions (NOX and VOCs are ozone precursors). Ozone formation and prediction is complex, non-linear, generally results from a combination of significant quantities of VOCs and NOX 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 single project on potential regional ozone formation and transport. However, to obtain region wide ozone assessment data the BLM has initiated the Colorado Air Resources Management Modeling Study (CARMMS). The study utilized the Comprehensive Air-quality Model with extensions (CAMx) to predict statewide impacts to air quality and air quality related values from projected oil and gas development out to year 2021 for three development scenarios (low, medium, and high). Each BLM field office was modeled with the source apportionment (SA) option, meaning that incremental impacts to regional ozone and AQRVs from development in these areas are essentially tracked to better understand the significance of such development on impacted resources and populations. The RGFO Area 1 SA results are shown below (i.e. where the project is located) and he complete CARMMS report is available online at http://www.blm.gov/co/st/en/BLM_Information/nepa/air_quality/carmms.html.

The General Conformity Rule at 40 CFR 93.153 defines the *de minimis* thresholds for NOX and VOC in a marginal or moderate ozone nonattainment areas, and outside of any designated transport region, as 100 tons per year (tpy). The federal action triggering the general conformity rule applicability analysis is the approval of the APD.

The proposed action(s) is scheduled to commence in the winter of 2016, with the construction phase lasting approximately 2 months. The life of the wells, if economically viable, would be expected to sustain operations for approximately 20 – 30 years once production begins. Maximum foreseeable direct and indirect emissions would occur at the beginning of the project (2016).

The Sonic Star project, as designed and submitted, have been evaluated in accordance with the requirements of 40 CFR 93.153 subpart B and have been found to conform for the following reason(s):

[X] Potential maximum total Direct and Indirect emissions that are not subject to exemptions under the rule are below *de minimis* threshold levels:

Ozone (NOX): 4.173 tpy in 2016 (maximum year, combined construction and production)

Ozone (VOC): 1.23 tpy in 2016 (maximum year, combined construction and production)

A screening-level near-field ambient air quality impact assessment was performed to quantify and evaluate maximum pollutant impacts at sensitive ambient receptors in the immediate area of the proposed Sonic Star well pad. The BLM Colorado near-field modeling tool uses the EPA AERMOD modeling system for estimating ambient air concentrations for access road (or corridor) construction / travel emissions and emissions associated with one or two centralized O&G well-pads / facilities. Five years (2008-2012) of Colorado-based surface and upper-air

meteorology is used to predict possible air quality impacts for both screening tools modules (roadway and centralized facilities). The screening model predicts the maximum concentration of a pollutant for a given receptor distance for typical O&G volume and point source release parameters (fugitive (non-combustion) and combustion related emissions sources, respectively). Using aerial images and GIS, the nearest ambient receptor (location of residence, business, school, hospital) was determined to be in excess of 3 km from the proposed site. The screening tool was run for the maximum emissions rate as determined from the emissions inventory for all of the estimated processes / activities. Table 3-5 presents the maximum results of the screening analysis.

Table 3-5 Screening Model Results

Pollutant	Standard	Modeled Parameter(s)	Level (ug/m3)	Concentration (ug/m3)		Percent of NAAQS
				Modeled	Background	
CO	1 hour	construction, point source (frac engines)	40,000	91.1	2.8	0%
NO2	1 hour	construction, point source (frac engines)	189	111.7	66	94%
NO2	Annual	construction, point source (frac engines)	100	2.6	18	21%
PM10	24 hour	construction, volume (fugitive dust)	150	28.8	41	47%
PM2.5	24 hour	construction, volume (fugitive dust)	35	6.31	27.3	96%
PM2.5	Annual	construction, volume (fugitive dust)	12	0.53	7.7	69%

* Percent of NAAQS is the modeled concentration plus the background divided by the standard. All backgrounds assumed to equivalent to the area monitoring data or data from adjacent counties. This analysis is a snapshot, and does not consider multi-year values where such standards exist (NO2, PM2.5)

As shown in the Table above, the maximum modeled impacts at the ambient receptors distance from proposed project well-pad emissions are below the applicable NAAQS. In order to achieve compliance with the PM NAAQS for the well-pad facility modeling, the construction activity dust emissions were controlled to levels attained by continuous watering. A 50% control assumption is a standard practice where daily watering of the disturbed surfaces is employed to control dust emissions. This control value is reflected in the emissions inventory.

The BLM also performed a screening analysis for two Hazardous Air Pollutants (HAPs); formaldehyde (point – engines), and benzene (volume – fugitives). Background pollutant concentration data collected at a regional monitoring site that is located in a high-density area of oil and gas were obtained from EPA Air Quality System (AQS) database and are included for total modeled concentrations. The background concentrations represent all non-project near-field emissions sources and are added to the near-field modeled concentrations to produce cumulative predicted near-field concentrations for comparison to applicable impact thresholds.

Short-term (1-hour) HAP concentrations are compared to acute Reference Exposure Levels (RELs). RELs are defined as concentrations at or below which no adverse health effects are expected. These values approximate pollutant concentrations likely to produce mild effects during 1-hour exposures. The 1 hr. maximums results for both pollutants were less than 10% of the applicable RELs.

Long-term maximum potential exposures to HAPs are compared to Reference Concentrations for Chronic Inhalation (RfCs). An RfC is defined by USEPA as the daily inhalation concentration at which no long-term adverse health effects are expected. RfCs exist for both non-carcinogenic and carcinogenic effects on human health. Annual modeled HAP concentrations are compared directly to the non-carcinogenic RfCs, and modeled benzene and formaldehyde annual average concentrations for all receptors are not more than 20% of their respective RfCs.

As for air quality related values (AQRVs) such as deposition and visibility impacts, the BLM used the Flag 2010 screening guidance for projects that are at distances greater than 50km from any Class I or sensitive Class II area to determine if a more refined analysis should be considered. Although the screening method is not explicitly applicable to non-PDS sources (i.e. minor sources), it still provides useful data for determining if additional analysis should be considered. The results (0.05 <= 10) of the Q/d analysis (NOX + PM10 + SO2 / distance (km)) suggest the project will have negligible impacts to Rocky Mountain National Park, the closest Class I area. Thus, no further discussion of project level AQRVs is warranted.

The implementation of the Proposed Action is estimated to contribute 3,758 tons of carbon dioxide equivalent (CO2e) in the maximum year (2015). Annual operating GHG emissions will be approximately 35% of the total emissions shown for the maximum year within the first year of full production. Over the average 25 year project time frame the total GHG emissions can be conservatively estimated to be approximately 35,325 tons of CO2e. The estimate is a linear interpolation and does not account for production declines nor additional lift or compression that may be required as the well ages. The total provided also 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 are all estimates at this time and will vary significantly over the life of the project making any prediction of the quantities of GHG emitted very speculative.

In 2010, the state of Colorado's GHG emissions was 130,000,000 metric tons[1]The proposed action's GHG emissions represent about 0.024% of the state of Colorado's GHG emissions on an annual basis. The relative magnitude of greenhouse gas emissions associated with the development of the well as compared to the state's GHG emission levels is extremely small. To provide additional context for the level of project emissions and potential impacts, the EPA has recently modeled global climate change impacts from a model source emitting 20% more GHGs than a 1500MW 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 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 uncertainly in the predictions. The EPA concluded that even assuming such an increase in temperature could be down scaled 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

[1] Colorado Greenhouse Gas Inventory—2014 Update Including Projections to 2020 & 2030, https://www.colorado.gov/pacific/sites/default/files/AP-COGHGInventory2014Update.pdf

emissions are a fraction of the EPAs modeled source and are shorter in duration, and therefore it is reasonable to conclude that the project would have no measurable impact on the climate.

Cumulative Impacts:

The area currently has a high degree of alteration in the form of agricultural fields, roads, houses, and oil and gas production. The addition of the infrastructure needed to construct and drill the additional pad and well would have a cumulative impact to the area's air quality; however, given the existing level of development in the area, the proposed action's impacts would be very minor. In the long term, if economical quantities of oil and gas are found and /or produced, additional wells can be expected to be drilled on Federal, State, and private lands. This could result in additional impact to air quality in the future.

As discussed above, the BLM in an effort to analyze cumulative impacts to air quality (including ozone and AQRVs), has initialized the Colorado Air Resources Management Modeling Study (CARMMS). The results shown below are for the high RFD scenario. The data is presented for four quasi cumulative source groups that range from the RGFO source apportionment (SA) area #1, i.e. where the tiger Tail project will occur (Note: the RGFO was broken up into 4 distinct geographical regions due to its size and varying levels and types of oil and gas development), to the full one atmosphere model domain that CAMx has the capability to simulate. The CARMMS report is not yet final, and is far too complex to provide an adequate summary of the study methodologies within this document. However, when the study concludes (projected to be the end of 2014), all of the CARMMS information will be available to the public via the BLM Colorado website.

Table 3-6 CARMMS High Emissions (2021 - tons)

SA Area (Group)	CARMMS High Scenario SA Area Name	PM10	PM2.5	NOX	VOC
I + J	RGFO O&G Federal	910	119	1,233	3,557
R	All BLM CO Federal O&G	7,856	1,430	29,245	67,929
S	All Colorado O&G (federal and non-federal)	37,842	6,888	131,649	313,464
W	CAMx Cumulative (4km)	*	339,768	814,425	2,140,889

*Data missing from draft CARMMS report

PSD Increment Impacts: EPA has defined PSD Concentrations Increments for Class I and II areas for 8 different pollutant concentration/averaging time combinations. In this section we present the "Average" PSD concentration impacts at applicable Class I and sensitive Class II areas. Of the 8 defined PSD increments, only the 24 hour PM10 and PM2.5 yielded significant data for RGFO Area 1. The increments for SO2 (all averaging times), annual PM10, annual PM2.5, and annual NO2 are of little consequence as RGFO SA Area 1 contributes 0% towards these area's metrics. The modeled impacts are based on the CAMx PSAT source apportionment contributions. For short-term averaging times (i.e., not annual), the highest second high concentration at each Class I/II area is selected for comparison with the PSD increment. Rows for source groups that had no predicted impacts (i.e., 0.000 ug/m3) were removed from table 3-7 to reduce its size. The PSD data below does not constitute an official PSD increment analysis, which is the sole function and responsibility of CDPHE. Further, the cumulative source groups do not represent PSD permit applications where such an analysis would be conducted. The data is presented for informational purposes only. Please note that it is expected that the

larger cumulative source groups would always exceed the increments which are used to gauge significance of individual sources or projects requiring such an analysis.

Table 3-7 CARMMS High Scenario – Average PSD Concentrations

Group	PSD Class I Increment	Max @ any Class I area	Percent of PSD Class I Increment	Class I Area where Max occurred	PSD Class II Increment	Max @ any Class II area	Percent of PSD Class II Increment	Class II Area where Max occurred
NO2 Annual								
R	2.5	0.350	14.0%	Mesa_Verde	25	0.436	1.7%	Hovenweep
S	2.5	0.787	31.5%	Mesa_Verde	25	1.242	5.0%	Hovenweep
W	2.5	2.371	94.8%	Petrified_Forest	25	25.466	101.9%	Aztec_Ruins
PM10 24-hour								
I	8	0.003	0.0%	Rocky_Mountain	30	0.002	0.0%	Mount_Evans
J	8	0.011	0.1%	Rocky_Mountain	30	0.008	0.0%	Mount_Evans
R	8	0.478	6.0%	Mount_Zirkel	30	0.483	1.6%	Raggeds
S	8	0.636	7.9%	Mesa_Verde	30	1.153	3.8%	Aztec_Ruins
W	8	217.661	2720.8%	Bandelier	30	191.183	637.3%	Dome
PM10 Annual								
R	4	0.108	2.7%	Mesa_Verde	17	0.126	0.7%	Raggeds
S	4	0.221	5.5%	Mesa_Verde	17	0.378	2.2%	Aztec_Ruins
W	4	15.409	385.2%	Salt_Creek	17	65.226	383.7%	Valle_De_Oro_NWR
PM2.5 24-hour								
I	2	0.001	0.1%	Rocky_Mountain	9	0.001	0.0%	Mount_Evans
J	2	0.006	0.3%	Rocky_Mountain	9	0.004	0.0%	Mount_Evans
R	2	0.455	22.7%	Mount_Zirkel	9	0.428	4.8%	Raggeds
S	2	0.480	24.0%	Mount_Zirkel	9	0.525	5.8%	Colorado
W	2	193.166	9658.3%	Bandelier	9	171.269	1903.0%	Dome
PM2.5 Annual								
R	1	0.101	10.1%	Mount_Zirkel	4	0.104	2.6%	Raggeds
S	1	0.111	11.1%	Mount_Zirkel	4	0.124	3.1%	Raggeds
W	1	7.359	735.9%	Bandelier	4	14.039	351.0%	Valle_De_Oro_NWR
SO2 3-hour								
R	25	0.531	2.1%	Dinosaur_CO	512	0.427	0.1%	Dinosaur_all
S	25	0.604	2.4%	Dinosaur_CO	512	0.486	0.1%	Dinosaur_all
W	25	27.514	110.1%	Bandelier	512	29.993	5.9%	Dome
SO2 24-hour								
R	5	0.135	2.7%	Dinosaur_CO	91	0.108	0.1%	Dinosaur_all
S	5	0.154	3.1%	Dinosaur_CO	91	0.123	0.1%	Dinosaur_all
W	5	8.620	172.4%	Bandelier	91	7.531	8.3%	Dome
SO2 Annual								
R	2	0.014	0.7%	Dinosaur_CO	20	0.011	0.1%	Dinosaur_all
S	2	0.016	0.8%	Dinosaur_CO	20	0.013	0.1%	Dinosaur_all
W	2	1.805	90.3%	Galiuro	20	0.863	4.3%	Bitter_Lake_NWR

Visibility Impacts: Table 3-8 displays the Class I and II areas where the maximum number of days Δdv (dv = deciview, w/ 1 dv being equivalent to a "just perceptible" change in visibility clarity) exceeds the 0.5 and 1.0 thresholds and the maximum Δdv due to the source groups. The RGFO SA Area 1 did not have any days where the modeled deciview change was greater than 0.5,

and thus according to the FLAG 2010 guidance, the projected development in this area does not contribute to visibility changes in any Class I or Class II area. All cumulative visibility impacts in the future improve for the 20% worst days. Approximately half of the 20% best visibility days at monitored Class I areas improve, while the other half degrade slightly (indicated by negative values) in the future. The results shown for the cumulative areas (Table 3-9) were selected based on the individual source group impact areas within Table 3-8.

Table 3-8 CARMMS High Scenario – Max dv Days and Calculated dv

Source Group	Max # Days > 0.5 dv @ Any Class Area	Where > 0.5 dv Count Occurs	Max # Days > 1.0 dv @ Any Class Area	Where > 1.0 dv Count Occurs	Max dv@ Any Class I	Where Max Occurs
Class I Area Impacts						
I	0	NA	0	NA	0.02253	CI_Rocky_Mountain
J	0	NA	0	NA	0.12545	CI_Rocky_Mountain
R	72	CI_Mount_Zirkel	12	CI_Mount_Zirkel	1.63971	CI_Flat_Tops
S	281	CI_Mesa_Verde	55	CI_Mesa_Verde	4.19030	CI_Rocky_Mountain
W	365	Multiple Areas	365	Multiple Areas	81.23828	CI_Pecos
Class II Area Impacts						
I	0	NA	0	NA	0.01337	CII_Mount_Evans
J	0	NA	0	NA	0.05321	CII_Mount_Evans
R	110	CII_Dinosaur_all	27	CII_Dinosaur_all	2.63206	CII_Colorado
S	288	CII_South_San_Juan	55	CII_Colorado	4.59771	CII_Colorado
W	365	Multiple Areas	365	Multiple Areas	57.91427	CII_Dome

Table 3-9 CARMMS High Scenario – Cumulative Worst & Best Days at Class I & II Areas

Class I Name	Class Type	State	2008 Base	2021 High	High w/o R	High w/o S	2021 High Improvement from 2008	dv from R	dv from S
Worst 20% Visibility (dv)									
Flat Tops Wilderness	I	CO	8.68	8.07	8.06	7.89	0.61	0.01	0.18
Mesa Verde NP	I	CO	11.20	10.82	10.79	10.77	0.38	0.03	0.05
Mount Zirkel Wilderness	I	CO	9.36	8.54	8.53	8.45	0.82	0.01	0.09
Pecos Wilderness	I	NM	11.33	10.86	10.80	10.76	0.47	0.06	0.10
Rocky Mountain NP	I	CO	12.04	11.15	11.14	11.09	0.89	0.01	0.06
Colorado NM	II	CO	8.68	8.00	7.98	7.78	0.68	0.02	0.22
Dinosaur NM	II	CO	8.68	8.06	8.05	8.02	0.62	0.01	0.04
Dome Wilderness	II	NM	11.33	11.17	10.95	10.75	0.16	0.22	0.42
Mount Evans Wilderness	II	CO	8.68	8.02	8.01	7.95	0.66	0.01	0.07
South San Juan Wilderness	II	CO	9.95	9.28	9.24	9.23	0.67	0.04	0.05
Best 20% Visibility (dv)									
Flat Tops Wilderness	I	CO	0.69	0.55	0.53	0.41	0.14	0.02	0.14
Mesa Verde NP	I	CO	3.12	3.28	3.24	3.21	-0.16	0.04	0.07
Mount Zirkel Wilderness	I	CO	0.95	0.84	0.83	0.72	0.11	0.01	0.12
Pecos Wilderness	I	NM	4.54	4.65	4.60	4.57	-0.11	0.05	0.08
Rocky Mountain NP	I	CO	1.91	1.87	1.86	1.82	0.04	0.01	0.05
Colorado NM	II	CO	0.69	0.60	0.58	0.45	0.09	0.02	0.15
Dinosaur NM	II	CO	0.69	0.57	0.56	0.53	0.12	0.01	0.04
Dome Wilderness	II	NM	4.01	4.64	4.41	4.19	-0.63	0.23	0.45
Mount Evans Wilderness	II	CO	0.69	0.57	0.56	0.52	0.12	0.01	0.05
South San Juan Wilderness	II	CO	2.25	2.28	2.23	2.21	-0.03	0.05	0.07

Deposition Impacts: Table 3-10 shows the cumulative model results for nitrogen deposition averaged across the entire class I or II area. Although sulfur deposition was also modeled, the BLM authorized emissions are insignificant such that disclosure would be meaningless. For the areas affected in Table 3-10 the future cumulative deposition values (source group W) are all above the critical load value of 2.3 kg/ha-yr (as identified by the National Park Service for sensitive high alpine ecosystems). Compared to the cumulative base year deposition model results, it's clearly evident that predicted deposition rates will be in decline in the future (Table 3-11). The result is consistent with the overall cumulative emissions inventory declines. Cumulative emissions from the RGFO SA Area 1 (I + J) are not significant.

Table 3-10 CARMMS High Scenario – Cumulative Nitrogen Deposition (Average)

Group	2021 Max @ any Class I area (kg/ha-yr)	Class I Area where Max occurred	2021 Max @ any Class II area (kg/ha-yr)	Class II Area where Max occurred
I	0.0001	Rocky_Mountain	0.0002	Lost_Creek
J	0.0006	Rocky_Mountain	0.0007	Lost_Creek
R	0.1454	Flat_Tops	0.1160	Colorado
S	0.2550	Flat_Tops	0.2191	Colorado
W	3.1160	Mount_Zirkel	8.8528	Valle_De_Oro_NWR

Table 3-11 CARMMS High Scenario – Class I Cumulative Nitrogen Deposition Change (Average)

Area	Class Type	2008 (kg/ha-yr)	2021 (kg/ha-yr)	2021 – 2008	% 2021 Reduction
Rocky_Mountain	I	3.50	2.58	-0.92	26.3
Flat_Tops	I	3.09	2.39	-0.70	22.6
Mount_Zirkel	I	3.95	3.12	-0.84	21.0

Ozone Impacts: EPA's Model Attainment Test Software (MATS) was used to make future year ozone Design Value (DV) projections using the CAMx 2008 Base Case and 2021 High Development Scenario modeling results. MATS was also used to make future year 2021 ozone DV (DVF) projections for the 2021 High Development Scenario removing the contributions of two of the combined Source Groups R and. MATS was used to make 2021 ozone DVF projections at the monitoring sites as well as throughout the CARMMS modeling domain using the MATS Unmonitored Area Analysis (UAA) procedures. Table 3-11 provides the change in predicted ozone values at monitored location throughout Colorado (as existed in 2008). All of the future monitor values go down in the future with the exception of the 0011 monitor in Larimer County. Further the total number of exceedances/violations drops from five monitors to two in the future. Federal oil and gas contributions (source group R) do not exceed 1 ppb in the DVF results. Figures 3-4 and 3-5 provide a graphical representation of how ozone concentrations are expected to change in the future, and in general the changes show decreasing values.

Table 3-11 CARMMS High Scenario –Cumulative Ozone Impacts

Name	**2008 Base DVC**	**DVF**			**Contributions**	
		2021 Hi	**2021 Hi w/o R**	**2021 Hi w/o S**	**Group R**	**Group S**
CO_Adams_3001	71.5	70.5	69.7	67.2	0.8	3.3
CO_Boulder_0011	77.3	74.4	73.5	69.0	0.9	5.4
CO_Denver_0014	70.3	69.0	68.3	66.2	0.7	2.8
CO_Douglas_0004	78.3	75.7	74.9	72.3	0.8	3.4
CO_El Paso_0013	68.0	66.0	65.4	64.5	0.6	1.5
CO_El Paso_0016	70.3	68.8	68.4	67.7	0.4	1.1
CO_Jefferson_0002	75.0	73.5	72.6	70.0	0.9	3.5

Name	2008 Base DVC	DVF			Contributions	
		2021 Hi	2021 Hi w/o R	2021 Hi w/o S	Group R	Group S
CO_Jefferson_0005	74.3	72.4	71.8	70.0	0.6	2.4
CO_Jefferson_0006	82.0	79.5	78.6	74.5	0.9	5.0
CO_Jefferson_0011	76.3	74.0	73.3	71.0	0.7	3.0
CO_La Plata_1004	70.0	69.8	69.5	69.3	0.3	0.5
CO_La Plata_7001	66.0	65.9	65.5	65.1	0.4	0.8
CO_La Plata_7003	67.0	66.8	66.4	66.0	0.4	0.8
CO_Larimer_0007	74.3	72.7	72.4	70.1	0.3	2.6
CO_Larimer_0011	78.0	78.9	78.6	73.5	0.3	5.4
CO_Larimer_1004	67.3	67.4	67.2	62.9	0.2	4.5
CO_Montezuma_0101	69.3	68.9	68.6	68.3	0.3	0.6
CO_Weld_0009	72.7	72.1	71.5	64.9	0.6	7.2

Figure 3-3 CARMMS High Scenario –Cumulative Ozone Impacts (DVC & DVF)

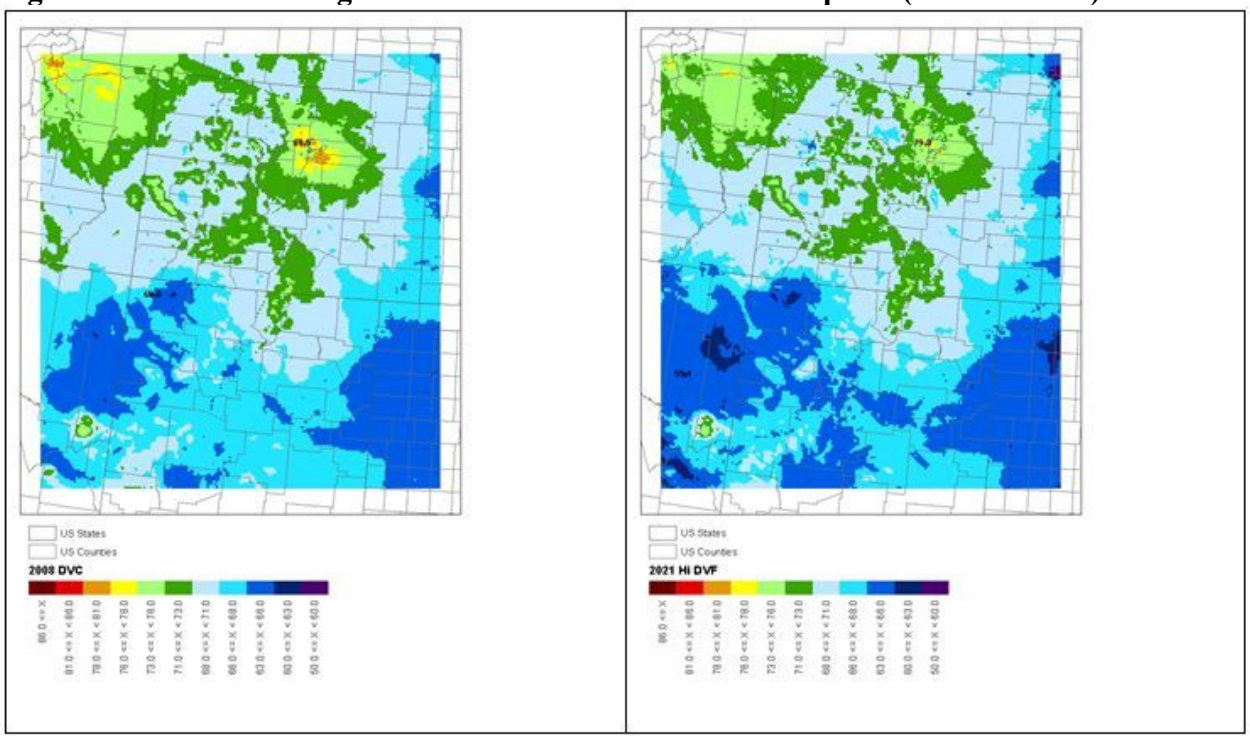


Figure 3-4 CARMMS High Scenario –Cumulative Ozone Impacts (Group R & S Contributions)

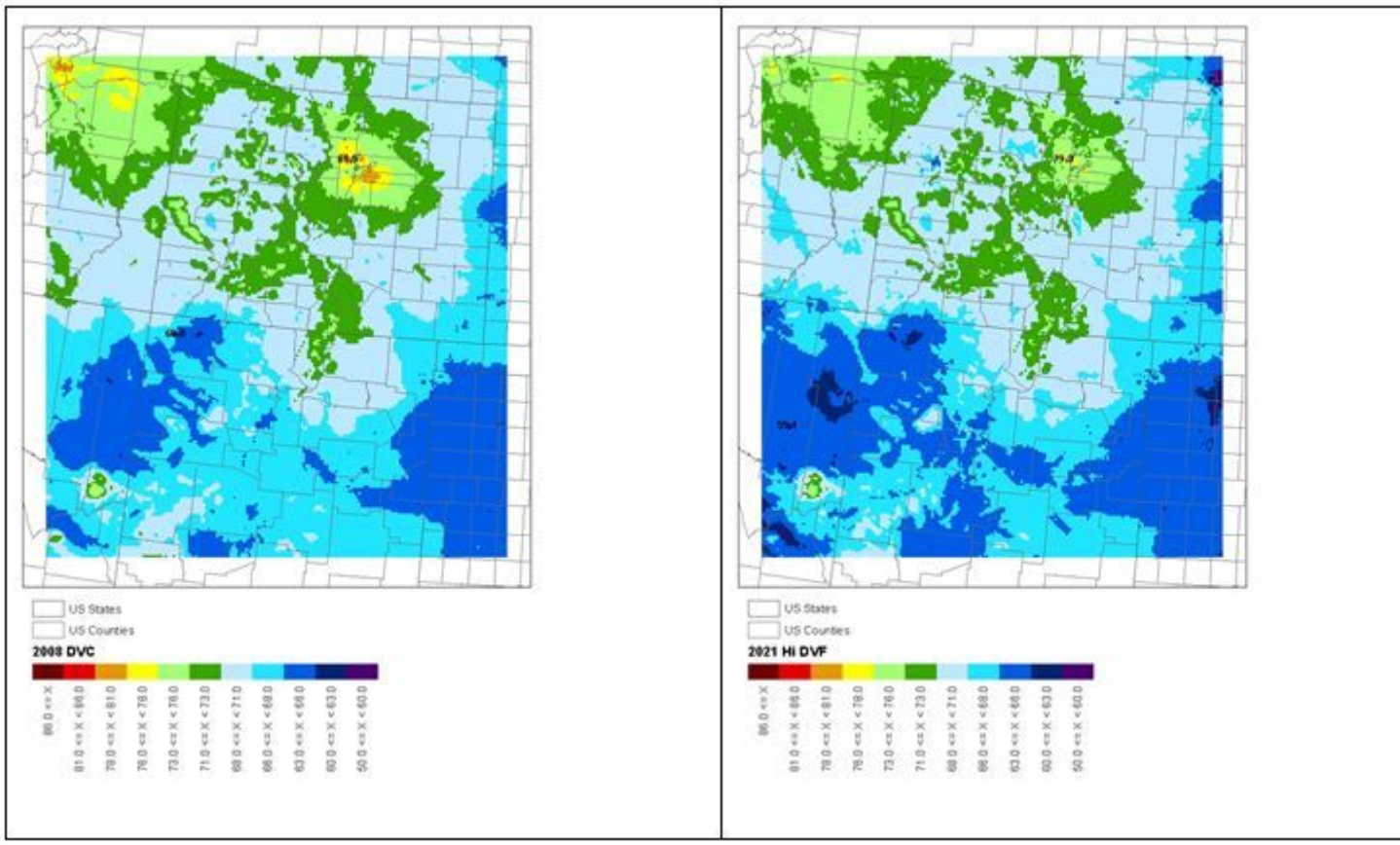
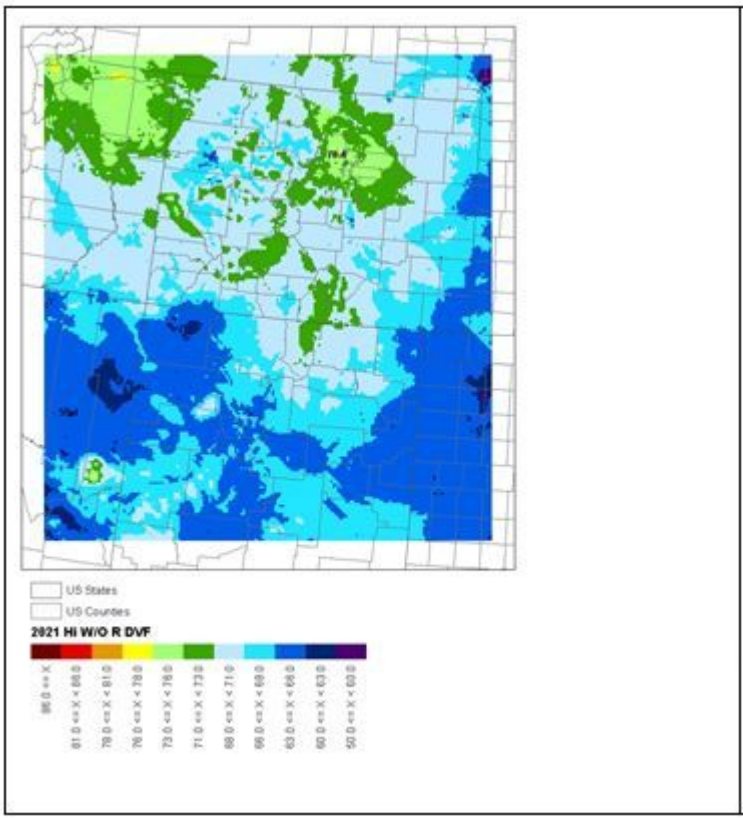
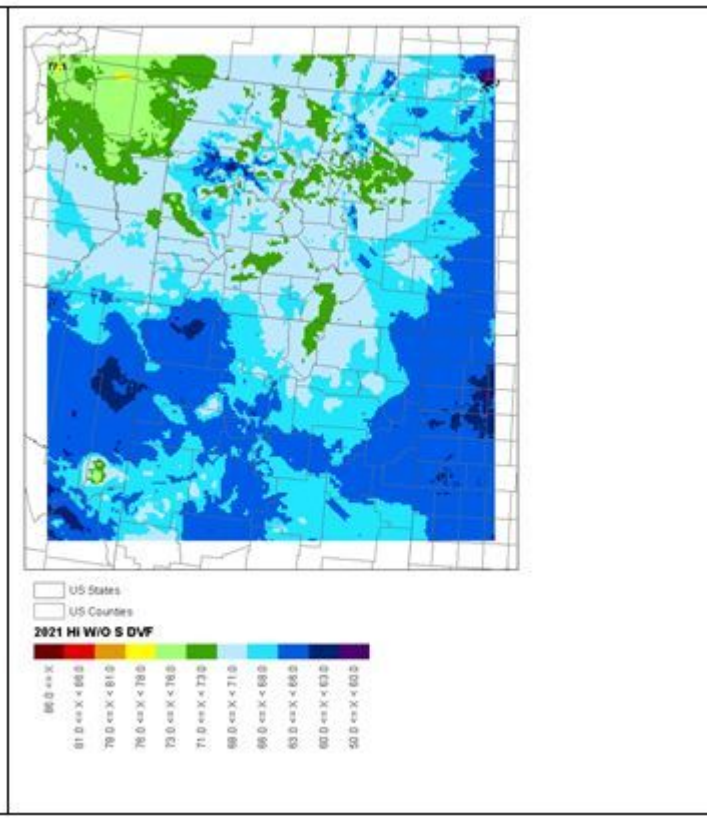


Figure 3-4 CARMMS High Scenario –Cumulative Ozone Impacts (w/o Groups R & S)





The 2021 High Development Scenario UAA ozone DVF without Source Group R (Federal O&G and mining in 13 CO BLM Planning Areas) results in reduction in the DVFs with the highest reduction of 6.4 ppb in the Piceance Basin and the peak DVF reduced from 79.3 to 78.4 ppb and occurs just northwest of Denver. There are still areas in Denver with 2021 DVFs exceeding the NAAQS with Source Group R removed. Removing both Federal O&G and mining and non-Federal O&G (Source Group S) results in more reductions in the 2021 DVFs, especially in Weld County in the greater Denver area. There are large reductions in 2021 DVFs in the Piceance and D-J Basins (Weld County) with the largest reduction being 12.8 ppb in the Piceance Basin. There are no longer any ozone exceedances in the greater Denver area without emissions from Source Group S.

PM**2.5** Impacts

Group	Name	Max		
		Max Contribution (ug/m3)	Corresponding 8th Daily Average	% Max Contribution
I	Royal Gorge FO Area#1 (RGFO#1) -- North	0.0253	39.1	0.06%
J	Pawnee Grasslands portion of RGFO#1	0.0881	38.2	0.23%

Greenhouse Gases and Climate Change

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

- 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 as mounting evidence suggests is already occurring, there could be impacts to other 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, which could result in more forage production provided there is sufficient precipitation. Drier conditions could have severe impacts on forests and woodlands and could leave these areas more susceptible to insect damage and at higher risk of catastrophic wildfires. Increased fire activity and intensity would increase greenhouse gas emissions, providing for a negative feedback loop. In fact most of the predicted changes on a global scale have some level of a predicted negative feedback loop, making the problem particularly vexing.

No Action Alternative (Direct and Indirect Impacts): None of the proposed action elements would be authorized and therefore none of the potential emissions causing activities 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 cumulative climatic changes will occur regardless.

Protective/Mitigation Measures: Carrizo Niobrara LLC. will comply with the following requirements and make every effort to minimize emissions through good engineering and operating practices to the maximum extent practical.

- Use industry best practices, including watering, graveling, and reseeding to reduce fugitive dust emissions from vehicular traffic and disturbed surfaces. Interim reclamation and any existing agricultural practices will be implemented in order to stabilize the site and prevent fugitive dust from being generated. No visible dust plumes should be observed leaving the site.
- All Drill Rigs and Non-Road Engines will be required to meet EPA Non-Road Tier II Emissions Standards, or better, for all drilling and completion operations.
- Process equipment will be permitted by CDPHE in accordance with applicable requirements and required emissions standards to limit the facility's potential to emit and provide appropriate operating, monitoring, and record keeping requirements.

3.2.2. Geologic and Mineral Resources

Affected Environment:

The proposed wells are located within the Wattenberg gas field in the Denver Basin, where the primary target is the Codell/Niobrara oil and gas. Most oil and gas in the Denver Basin has been produced from Cretaceous sandstones: J-Sandstone, Codell Sandstone, Niobrara Formation, Hygiene Sandstone, and Terry Sandstone (also known informally as the Sussex and Shannon Sandstones). The Project Area is surrounded by privately owned producing gas wells on a Colorado state spacing order of 20 acres per well.

Groundwater resources in the area include the Laramie-Fox Hills aquifer, the lowermost of the Denver Basin aquifer system. The aquifer underlies approximately 6,700 square miles and marks the areal extent of the basin for economic ground water development. The Laramie-Fox Hills aquifer is from 250 to 300 feet thick, and includes about 150 to 200 feet of fine-grained and medium-grained sandstone. Water is also present in the Upper Pierre Shale at depths of up to 1,500 feet (CDWR, 2013). Water from the aquifer is used extensively throughout the area for domestic and agricultural purposes. Well yields may be as high as 100 gallons per minute (GPM), but are generally somewhat lower. Both the Laramie-Fox Hills and Arapahoe aquifers are under artesian pressure at the present time.

In addition to oil and gas, uranium and coal resources are also found in Weld County. Uranium resources are found in the Upper Laramie Formation north of Greeley. Coal resources are found throughout the Denver Basin in the Denver Formation and the upper Laramie Formation in the Denver Basin, although most of the coal resources in the Denver Basin have come from Laramie Coals. Sand and gravel resources are also located throughout Weld County; several sand and gravel pits have also been developed within five miles of the proposed wells.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts:

The Proposed Action would drill through the Laramie-Fox Hills aquifer to produce hydrocarbons from underlying formations. The Laramie formation contains important coal and uranium deposits. During drilling operations on parcels, loss of circulation or problems cementing the surface casing could directly affect freshwater aquifer and mineral zones encountered. Known water-bearing zones in the APD areas would be protected by drilling requirements and, with proper practices, contamination of ground water resources is highly unlikely.

Protective/Mitigation Measures:

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 and prospective mineral zones. At the APD stage, geologic and engineering reviews will be completed to ensure that cementing and casing programs are adequate to protect all downhole resources. Known water bearing zones in the APD area are protected by drilling requirements and, with proper practices, contamination of ground water resources is highly unlikely. Casing along with cement would be extended well beyond fresh-water zones to ensure that drilling fluids remain within the well bore and do not enter groundwater.

Cumulative Impacts:

Cumulative impacts on geology and minerals resources would primarily occur as a result of development, which would irreversibly deplete recoverable hydrocarbons from the producing formation.

No Action Alternative:

Under the No Action alternative, the APDs would be denied, and no federal action would occur. Not approving the APDs could result in a situation in which reservoirs are not adequately developed, and public minerals could be drained by nearby private or state wells. The applicant could explore and develop the private land and private minerals and not access the federal minerals. Drainage cases commonly occur in northeastern Colorado where land and mineral ownership patterns are complex.

Direct and Indirect Impacts:

May be similar to proposed action.

Protective/Mitigation Measures:

None

Cumulative Impacts:

May be similar to proposed action

3.2.3. Soils

Affected Environment:

Pad

The proposed access road and pad are primarily on Nunn Clay Loam 0–6% slope, with a portion if the road on Renohill Fine Sandy Loam 0–6% slope, and a small portion of the pad on Wages Fine Sandy Loam 0–6% slope.

Nunn Clay Loam 0–6% slope is derived from calcareous loamy alluvium, with root restrictive layers and depth to water table greater than 80 inches deep. Calcium carbonate maximum in profile is 15 percent and the natural drainage class is well drained, with low runoff potential and no frequency of flooding or ponding. This soil does not meet hydric criteria. Nunn Clay Loam is in the Loamy Plains (R067BY002CO) Ecological site, and is prime farmland if irrigated. The project area is not irrigated.

Renohill Fine Sandy Loam 0–6% slope is derived from Calcareous, clayey loamy residuum weathered from shale, with root restrictive layers 20 to 40 inches to paralithic bedrock. Depth to water table is greater than 80 inches. Calcium carbonate maximum in profile is 15 percent and the natural drainage class is well drained, with low runoff potential and no frequency of flooding or ponding. This soil does not meet hydric criteria. Renohill Fine Sandy Loam is in the Loamy Plains (R067BY002CO) Ecological site, and is not prime or unique farmland.

Wages Fine Sandy Loam 0–6% slope is derived from calcareous loamy alluvium, with root restrictive layers and depth to water table greater than 80 inches deep. Calcium carbonate maximum in profile is 15 percent and the natural drainage class is well drained, with low runoff potential and no frequency of flooding or ponding. This soil does not meet hydric criteria. Nunn Clay Loam is in the Loamy Plains (R067BY002CO) Ecological site, and is not prime or unique farmland.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts:

The proposed project would disturb approximately 5 acres of land surface. Post interim reclamation, approximately 3.5 acres would remain disturbed for throughout the life of the well. This is assuming successful interim reclamation including re-contouring, seeding, and necessary stabilization. After the well is plugged at the end of it's productive life, the entire disturbed area will be reclaimed. The proposed action would have a moderate to major direct impact to soils present at the construction site. Indirectly, the increased runoff from the disturbed soils could result in increased erosion and gullying down gradient. Due to the gentle slopes, high infiltration rate of the native soils, and construction standards being proposed, impacts to soils off site would be minor.

Project construction could result in a small percent of increased wind erosion during initial operations of associated with construction and drilling, however would be mitigated by applications of water or chemicals for dust abatement as needed. A risk of windblown erosion will continue until those disturbed lands are hardened, reclaimed by vegetation cover, protected by tackifier, straw, or manure, or protected by other methods. Overall-negative effects to soil resources, such as loss of top soil resulting from wind erosion should be reduced significantly

through the correct implementation of interim and final reclamation measures and the implementation of BMPs during the construction. Continued monitoring and maintenance of the pads would be required to limit any further or unnecessary impacts to soil resources.

Protective/Mitigation Measures/Residual Effects:

After completion and/or abandonment of the well, the soils would still be irreversibly different than they originally were. Overall, with the proposed reclamation and stormwater and dust abatement practices, soil productivity would not be considerably altered if the proposed areas are abandoned. All infrastructure (roads, drill pads, etc.) being proposed, would be built to Colorado Oil and Gas Conservation Commission standards. No additional mitigation would be required.

Cumulative Impacts:

The area around the proposed wells has a variety factors effecting soils including other oil and gas development (most of which is non-federal), roads, housing, agriculture, and livestock grazing. The addition of the infrastructure needed to drill the pads would have an additional impact to the areas soils. In the long term, if economical quantities of oil and gas are found, additional wells can be expected to be drilled. This could add a large amount of disturbance that could have a larger impact on soils in the future.

No Action Alternative:

Direct and Indirect Impacts:

None.

Protective/Mitigation Measures:

None.

Cumulative Impacts:

None.

3.2.4. Hydrology/Water Quality

Surface, Groundwater, Floodplains

Affected Environment:

There is no surface water within a one mile radius of the proposed location. Annual rainfall is estimated between 12 and 18 inches per year. Groundwater resources in the area include the Laramie/Fox Hills aquifer, the lowermost of the Denver Basin aquifer system. The aquifer underlies approximately 6,700 square miles and marks the areal extent of the basin for economic ground water development. At the well location, the Laramie/Fox Hills aquifer is anticipated to be 128 feet deep and 303 feet thick, and includes about 150 to 200 feet of fine-grained and medium-grained sandstone. Water can be present in the Upper Pierre Shale at depths of up to 1,500 feet (CDWR, 2013). Water from the aquifer is used extensively throughout the area for

domestic, irrigation, livestock and industrial (mainly oil and gas) purposes. Well yields may be as high as 100 gallons per minute (GPM), but are generally lower.

The Colorado Oil and Gas Conservation Commission (COGCC) interactive map shows seven permitted groundwater wells within the area. However, based on cattle trailing and visible stock ponds seen in aerial photos it appears there may be more water wells than shown in the state records. Within a one mile radius of the proposed pads are the following groundwater wells:

Permit No.	PLSS	Depth [ft]	Owner
55944–F-	8N60W S11 NW/SE	Not Drilled	US Air Force
55943–F-	8N60W S11 NW/SE	30	US Air Force
42350–	8N60W S11 SW/NE	Not Drilled	USA (Located on Forest Service Land)
42516–	8N60W S11 SE/NE	136	US Forest Service
37091-	8N60W S12 NE/NE	110	US Forest Service
13952-F -	8N60W S14 SE/NE	100	Paul Hnizdil
43844-	8N60W S14 SE/NE	105	William & Barbara Schneider

All wells are listed under an “ALL UNNAMED AQUIFERS” class.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts:

The State of Colorado regulates water use within Colorado, including water used for oil and gas development. 100% of the water for this project will be purchased from Grassland Water Solutions, and will come from wells it operates at it’s Pawnee facility. These water wells produce from the Upper Laramie and Laramie-Fox Hills Aquifer located in the Upper Crow Creek Designated Groundwater Basin, which is deemed non-tributary to the South Platte River. It is estimated that 11.2 acre feet of water will be required to construct the pad and road, drill and complete this well.

Surface water impacts of the proposed wells are mainly associated with the surface disturbance associated with drilling and related infrastructure after well completion. For the proposed project, approximately 5.5 acres would be disturbed. Most impacts to surface water from oil and gas activity is due to removal of vegetation and exposure of mineral soils. Specific impacts would be soil compaction caused by construction that would reduce the soil infiltration rates, in turn increasing runoff during precipitation events. Downstream effects of the increased runoff may include changes in downstream channel morphology such as bed and bank erosion or accretion. The potential for increased runoff is greater during the construction and drilling phase of the project, and would be reduced or eliminated after successful interim and final reclamation. Due to the flat nature of the topography, high infiltration rates and low potential for runoff of the soils in the project area, stormwater management plans and interim reclamation practices little to no new impacts to surface water quality would result from the surface disturbance portion of drilling the proposed wells. Additional surface water impacts could result from chemicals, or other fluids, accidentally spilled

or leaked during the development process and could result in the contamination of both ground and surface waters. State and Federal regulations reducing the potential for spills and requiring spill clean-up, along with operator committed best management practices such as elimination of pits with closed loop drilling and use of enclosed steel frac tanks would mitigate this potential impact.

The proposed well would pass through usable groundwater. Groundwater in this area is relied on for agricultural, industrial and, domestic use. If contamination of groundwater from any source occurs, changes in groundwater quality could impact springs and water wells that are sourced from the affected aquifers. Potential impacts to groundwater resources could occur if proper drilling and completion practices are not followed. This could include loss of well integrity, surface spills, or loss of fluids in the drilling and completion process. It is possible for drilling fluids (mud) 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. When this occurs, drilling fluids can be introduced into groundwater without proper cementing and casing. Fresh water based mud will be used when drilling through usable water zones. Usable water zones will protected with surface casing, which is set and cemented before drilling into hydrocarbon producing zones. Site specific conditions and drilling practices determine the probability of this occurrence and determine the groundwater resources that could be impacted. After well is drilled and cased, it will be completed using hydraulic fracturing.

Hydraulic fracturing is the process of injecting high pressure fluid into the target formation in order to open naturally occurring fractures in the formation, allowing hydrocarbons to flow into the completed portion of the wellbore. The target formations where the hydraulic fracturing treatment takes place is separated from usable groundwater zones by a geologic "confining layer" that is thousands of feet thick. Hydraulic fracturing fluid typically contains about 90% water, 9% sand, with chemical additives making up the remaining volume. These chemicals typically consist of substances such as acid, surfactant, friction reducer, gelling agent and breaker, scale inhibitor ph adjusting agent, ect. COGCC regulations require operators to publicly disclose chemicals used in hydraulic fracturing on FracFocus: http://fracfocus.org/

At the APD stage, geologic and engineering reviews are performed to ensure that mud programs, cementing and casing programs are adequate to protect all downhole resources. BLM Onshore Order #2 requires the protection of usable water zones (TDS< 10,000). This includes proper casing, cementing and plugging (upon abandonment) procedures, making contamination of ground water resources highly unlikely. Surface casing and cement would be extended beyond usable water zones. Production casing will be extended and adequately cemented within the surface casing to protect other mineral formations, in addition to usable water bearing zones. These requirements insure that drilling fluids, hydraulic fracturing fluids and produced water and hydrocarbons remain within the well bore and do not enter groundwater, or any other formations.

The State of Colorado also has oil and gas regulations in place to protect ground and surface waters, including the regulation of hydraulic fracturing.

Protective/Mitigation Measures:

No additional mitigation is required to protect water resources beyond regulations and operator committed measures in the APD.

Cumulative Impacts:

Most of the watershed is undeveloped other then oil and gas development. The other uses include agriculture and cattle grazing. With regulations and operator committed measures in the APD, cumulative impacts to surrounding areas are expected to be minimal.

No Action Alternative:

Direct and Indirect Impacts:

Under the No Action Alternative, the operator would not be allowed to drill this well as planned, so it is unlikely that the pad and road would be constructed, resulting in no impact. However, since the surface ownership is private, and there are fee minerals in the area, there is the possibility that a similar action could take place to develop non federal minerals, possibly resulting in impacts similar to the proposed action.

Protective/Mitigation Measures:

None

Cumulative Impacts:

None

3.3. Biological Resources

3.3.1. Threatened, Endangered and Proposed Species

Affected Environment:

The list of federally listed threatened, endangered and proposed species and designated critical habitat for Weld County was obtained from the US Fish and Wildlife Service for the action area on October 7, 2015 from that agency's iPaC website. Of the threatened and endangered species that may be present in Weld County, nine species have range within a ½ mile of the proposed action area, which includes the proposed well pad, access road and drill line, or need to be considered due to downstream South Platte River concerns. Those listed species include: Interior least tern *(Sternula antillarum*), Mexican spotted owl *(Strix occidentalis lucida*), piping plover (*Charadrius melodus*), whooping crane (*Grus americana*), Preble's meadow jumping mouse (*Zapus hudsonius preblei*), Colorado butterfly plant (*Guara neomexicana spp. Coloradensis*), Ute ladies' tresses orchid (*Spiranthes diluvialis*), Western prairie -fringed orchid (*Platanthera praeclara*), and Pallid sturgeon (*Scaphirhynchuys albus*). Natural history and critical habitat descriptions for these species can be found in the Biological Assessment appendix in the administrative record.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts: There are no cool moist canyons or cliffs within a ½ mile of the proposed action area, therefore suitable habitat for Mexican spotted owl is not present. Additionally, there are no wetlands, creeks, fens, springs or seeps within ½ mile of the proposed action area, therefore suitable habitat for Colorado butterfly plant, Ute ladies'-tresses orchid, Preble's meadow jumping mouse is not present. There would be NO EFFECT to Mexican spotted owl, Colorado butterfly plant, Ute ladies'-tresses orchid, Preble's meadow jumping mouse from the proposed Carrizo Sonic Star APD for the following reasons: 1) suitable habitat is not present, 2) there would be no direct or indirect effects to habitat or the species, and 3) there would be no cumulative effects.

Interior least tern, piping plover, whooping crane, pallid sturgeon and Western prairie fringed orchid do not occur in Colorado and therefore dry land operations in Colorado would not affect these species. Furthermore, the proposed action does not include water depletions from the South Platte River. Therefore, suitable habitat for Interior least tern, piping plover, whooping crane, pallid sturgeon and Western prairie fringed orchid located in the South Platte River downstream of the action area would not be affected by the project. There would be NO EFFECT to Interior least tern, piping plover, whooping crane, pallid sturgeon and Western prairie fringed orchid for the following reasons: 1) Only non-tributary water would be used; water levels in the South Platte River would not be affected, 2) these species do not occur in Colorado and would not be affected by dry land operations in Colorado when non-tributary water is the only water source, and 3) there would be no cumulative effects.

Protective/Mitigation Measures: None.

Cumulative Impacts: These are discussed above.

No Action Alternative:

Direct and Indirect Impacts: Since suitable habitat for Mexican spotted owl, Colorado butterfly plant, Ute ladies'-tresses orchid, Preble's meadow jumping mouse is not present, the No Action Alternative would have NO EFFECT on those species. Since water depletions would not occur in the No Action Alternative, there would be NO EFFECT Interior least tern, piping plover, whooping crane, pallid sturgeon and Western prairie fringed orchid from that alternative.

Protective/Mitigation Measures: None

Cumulative Impacts: None

3.3.2. Vegetation

Affected Environment: Key species such as green needlegrass, western wheatgrass, American vetch, fourwing saltbush and winterfat have been reduced to remnant amounts. Blue grama and buffalograss have increased in abundance, dominate the community, and are beginning to take on a sod appearance. Sand dropseed, red threeawn, sixweeks fescue, plains pricklypear, hairy

goldaster and bottlebrush squirreltail have also increased. This plant community is at risk of losing western wheatgrass, which is the major cool season grass left at this point.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts: Generally oil and gas development involves complete removal of vegetation and at times re-contouring of the landscape to allow for resources to be retrieved. The type of ground activity associated with oil and gas development does result in increased susceptibility to adverse impacts such as soil compaction, weed infestations and erosion (See Soils and Invasive Plants sections). Due to these adverse impacts, establishment of native vegetation similar to adjacent undisturbed vegetation can take up to 30 years..

Protective/Mitigation Measures: See 2.2.1 Proposed Action.

Cumulative Impacts: Pad construction for the project would result in a slight reduction in native vegetation in the general project area, however, much of the vegetation in the project area is already highly modified as a result of oil and gas and agricultural activities.

No Action Alternative:

Direct and Indirect Impacts:

None

Protective/Mitigation Measures: None

Cumulative Impacts:

None

3.3.3. Sensitive Species

Affected Environment:

Seven BLM Sensitive species are believed to have suitable habitat within ½ mile of the proposed action area. These species are: mountain plover *(Charadrius montanus)*,* long-billed curlew *(Numenius americanus)*,* ferruginous hawk *(Buteo regalis)*,* golden eagle *(Aquila chrysaetos)*,* burrowing owl *(Athene cunicularia)*,* Black-tailed prairie dog *(Cynomys ludovicianus),* and swift fox *(Vulpes velox)*. See the Analysis for BLM Sensitive Species in the administrative record for more information. Species denoted with an asterisk are further protected under the Migratory Bird Treaty Act.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts: The following is a list of possible effects on the above BLM sensitive species that could occur from the proposed action: 1) Long-term loss of approximately 5 acres of suitable breeding and foraging habitat from

construction and site conversion from grassland to development; 2) Fragmentation of suitable breeding and foraging habitat; 3) Degradation of approximately 5 acres of suitable breeding and foraging habitat from post construction reclamation; 4) Disturbance to individual animals from construction and operation noise; 5) Flushing individual animals from human presence, especially during construction and initial operations, maintenance, etc.; 6) Abandonment of reproductive sites for individual animals, if present, short-term and long-term; 7) Changes in insect or small mammal prey assemblages, mixed results; 8) Predation from opportunistic species associated with humans and development (e.g. fox, coyote, crows, etc.); 9) Predation from raptors due to construction of structures that could serve as perches (e.g. new fences, drill rigs, etc.); and 10) Collisions with vehicles, increased risk of mortality, reduction in safe passage. A portion of the affected suitable habitat may be reclaimed but the effects would likely persist due to the structure, operations and maintenance. Reclamation would reduce the level of effects, but would not eliminate effects. Because the limited spatial extent of this particular pad, the direct and indirect effects would be narrow in scope and spatial extent, and limited to individuals.

Protective/Mitigation Measures: Please refer to the conservation measures described in the Migratory Bird section that would be applicable for mountain plover, long-billed curlew , ferruginous hawk, golden eagle, and burrowing owl.

Cumulative Impacts: Cumulative effects would occur for mountain plover, long-billed curlew , ferruginous hawk, golden eagle, burrowing owl, black-tailed prairie dog, and swift fox given the spatial extent and intensity of oil and gas development, agricultural production, housing developments in the vicinity of the proposed action area. The cumulative effects felt would be similar to those described above, but at a much broader portion of the species' range. In addition, it can be assumed that to some degree these BLM sensitive species would avoid oil and gas developments even after construction is completed and lands are reclaimed.

Overall, this particular proposed application for permit to drill would not affect the population at the planning area, nor cause a trend towards listing.

No Action Alternative:

Direct and Indirect Impacts: The No Action Alternative would likely have no effects on mountain plover, long-billed curlew , ferruginous hawk, golden eagle, burrowing owl, black-tailed prairie dog, and swift fox. Habitat for these species would not be affected and individuals would not be disturbed.

Protective/Mitigation Measures: None

Cumulative Impacts: There would be no cumulative effects to these species because of the lack of direct and indirect effects.

3.3.4. Terrestrial Wildlife & Migratory Birds

Affected Environment:

Eleven migratory birds described as priority BLM species, bird species of conservation concern by Colorado Partners in Flight or US Fish and Wildlife Service Birds of Conservation Concern (BCC) – 2008 List for BCR 18-Shortgrass Prairie could occur within the ½ mile action area. These species are believed to winter and/or breed in or near the project area and have declining populations. See the Analysis for Migratory Birds in the administrative record for more information.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts: For the migratory bird species considered, the following effects could be expected from the proposed action: 1) maintenance, construction and operations during nesting season may damage nests, could cause a short-term and long-term loss of approximately 5 acres of nesting habitat; 2) these species may nest attempt nest building in the action area annually and on-going operations could affect their ability to reproduce in the action area, cause them to flush from the area, and abandon their nests or chicks; 3) foraging habitat would be minimally affected. Because the spatial extent of this particular proposed application for permit to drill would occur but would be limited in spatial extent, the effects to breeding and foraging would be limited to individual birds.

Protective/Mitigation Measures: Before construction, conduct bird surveys during the breeding season appropriate for the bird species described in this analysis, being between May 20th to July 10th, within a 1/8 mile of the entire project area and to include all proposed construction and activity area. Surveys shall be coordinated with the BLM wildlife biologist and shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 a.m. under favorable conditions, following interior line transects (Hanni 2002) or Monitoring Colorado Bird's (MCB) point transects (Leukering 2000), or other pre-approved protocol. If surveys result in positive detection of breeding migratory birds or raptors, then no vegetation and ground surface-disturbing activities would be allowed for a 60-day period during the core breeding season of these birds to provided limited protection of migratory bird and raptor breeding activities; the 60-day period shall be coordinated with the BLM wildlife biologist to ensure appropriate protections of breeding activity are provided. If raptor nests are detected then a 1/2 mile buffer, or a comparable stipulation depending on the raptor species, would be required. If surveys result in negative detection of breeding migratory birds or raptors, then construction activities could proceed. If bird surveys are not feasible, then no construction or implementation activities would be allowed between May 15th and July 15th to provide limited protection of migratory bird and raptor breeding activities. Vegetation and ground surface-disturbing activities that are initiated prior to March 1st may continue through the breeding season because it is assumed loss of suitable breeding habitat occurred in the project area prior to the start of the bird breeding season, which would preclude these species from nesting in the area.

Cumulative Impacts: Cumulative effects to these species and individual birds could be felt due to the large extent to which surrounding lands are developed for oil and gas, as well as for agricultural production, housing developments, etc. Since most

of the surrounding lands are privately owned, there would be little protection under the Migratory Bird Treaty Act for these species from these non-federal activities.

No Action Alternative:

Direct and Indirect Impacts: There would be no effect to these migratory bird species or their habitats because it would be unlikely for non-federal minerals to be developed in this site.

Protective/Mitigation Measures: None

Cumulative Impacts: Since there would be no direct or indirect effects, there would be no cumulative effects to migratory birds from the No Action Alternative.

3.4. Heritage Resources and Human Environment

3.4.1. Cultural Resources

Affected Environment: A segment of the Burlington and Missouri River Railroad grade (5WL1423.42), which qualifies as a historic property, is present in the area of potential effect (see Report CR-RG-15-46 P). Because the operator is unable to avoid crossing the historic property with an access road, BLM determined that the undertaking has the potential to adversely affect the site. involving installation of a specially-designed ramp to allow traffic to cross the railroad grade, archaeological monitoring during construction of the ramp, and submission of a document narrating the history of the Burlington and Missouri River Railroad, including detailed maps.

Direct and Indirect Impacts: A temporary access road will be built across the railroad grade, which has already been breached to the north and to the south. There will be no indirect effects.

Protective/Mitigation Measures: In a Memorandum of Agreement executed on May 18, 2015, among BLM, the Colorado State Historic Preservation Office, the United States Forest Service, and Carrizo (Niobrara) LLC, the parties agreed to the stipulations below. A copy of the MOA is in the project casefile. Once the stipulations are addressed by the proponent, all adverse effects related to the undertaking will be resolved, and no additional mitigation actions will be required. Stipulations:

1. The portion of the proposed access road across Site 5WL1423.42 will be constructed to minimize impacts and preserve the physical integrity of railroad grade. Specifically, the access road will be designed using the following approach:

2. Place a non-woven geotextile on top of the existing ground surface (soil and vegetation) over and extending a minimum of 25 ft (7.6 m) on each side of the former railroad grade. The width of the geotextile will extend a minimum of 5 ft (1.5 m) beyond the edge of the proposed access road. The purpose of the non- woven geotextile is to provide a physical barrier between the native land and road fill to ensure only construction-based materials are removed during final reclamation.

3. Construct a soil ramp using fill material placed over the non-woven geotextile. Place a geogrid material on top of the fill material over and extending a minimum of 25 ft (7.6 m) on each side of the former railroad grade. The width of the geogrid will extend a minimum of 5 ft (1.5 m) beyond the edge of the access road. The purpose of the geogrid is to reinforce the

soils by allowing the distribution of weight to a larger area thereby reducing the potential for soils to separate under tension.

4. Install 8 inches of compacted aggregate and surface material over the top of the geogrid extending to the width of the access road.

5. An archaeologist that holds a BLM permit in good standing will perform monitoring during the construction of the road over Site 5WL1423.42, as well as when the temporary road is eventually dismantled.

6. The archaeological monitor will be present throughout the construction of the road in the vicinity of the railroad grade, and until in his or her professional judgment, the risk to the historic property is minimal. The archaeological monitor will have the authority to stop the work if undue damage is occurring, and will contact the BLM immediately.

7. Any cultural resource (historic or prehistoric site or object) discovered by the monitor will be immediately reported to the BLM. All operations in the immediate area of the discovery will be suspended until written authorization to proceed is issued by the BLM. An evaluation of the discovery will be made by the BLM to determine appropriate actions to prevent the loss of significant cultural or scientific values. The operator will be responsible for the cost of evaluation and any decision regarding proper mitigation measures will be made by the BLM.

8. Mitigation of the adverse effect to Site 5WL1423.42 will consist of the completion of an expanded Colorado Cultural Resource site form for the Burlington and Missouri River Railroad, including a detailed narrative history and maps that show the entirety of the line. The documentation will not be considered complete until a final draft has been approved by the BLM and SHPO.

Cumulative Impacts: None.

No Action Alternative:

Direct and Indirect Impacts: None.

Protective/Mitigation Measures: None.

Cumulative Impacts:None.

3.4.3. Paleontological Resources

Affected Environment:

The proposed wells are located on the eastern flank of the Denver Basin. The Basin consists of a large asymmetric syncline of Paleozoic, Mesozoic, and Cenozoic sedimentary rock layers, trending north to south along the east side of the Front Range from about Pueblo north to Wyoming. The basin is deepest near Denver and ascends gradually to its eastern outcrop in central Kansas. The White River Formation underlies the proposed well location.

The White River formation is a Class 5 geologic formation, according to the BLM's Potential Fossil Yield Classification (PFYC) System that was created to assist in determining proper mitigation approaches for surface disturbing activities (WO IM 2008-009). This is a Class 5 formation because it is highly fossiliferous and indicates the highest potential for paleontologic

resources. The potential for this proposed project to be sited on or impact a significant fossil locality is high. There are several vertebrate fossil finds in the same formation within located near the proposed well locations.

Environmental Effects

Proposed Action:

The proposed access roads, pipelines, and well pads would disturb the surface, potentially penetrate the protective soil layer and potentially encounter federally protected vertebrate fossils.

Direct and Indirect Impacts:

Potential impacts to fossil localities would be both direct and indirect. Direct impacts to or destruction of fossils would occur from unmitigated activities conducted on formations with high potential for important scientific fossil resources. Indirect impacts would involve damage or loss of fossil resources due to the unauthorized collection of scientifically important fossils by workers or the public due to increased access to fossil localities in the Project Area. Adverse impacts to important fossil resources would be long-term and significant since fossils removed or destroyed would be lost to science. Adverse significant impacts to paleontological resources can be reduced to a negligible level through mitigation of ground disturbing activities. It is possible that the proposed project would have the beneficial impact that ground disturbance activities might result in the discovery of important fossil resources.

Protective/Mitigation Measures:

The proposed construction of the well pads, access to the well pads, and pipeline may penetrate the protective soil layer impacting the bedrock unit below. Because a highly fossiliferous (Class 5) formation is present and susceptible to adverse impacts, mitigation measures are required. The BLM recommends that a field inventory be performed by a BLM qualified paleontologist prior to any surface disturbing activity. Depending on the results of the inventory, monitoring during construction may be recommended. If any significant fossils are found, development of a research design and data recovery may also be recommended before the project proceeds. Any fossils recovered on private land belong to the private landowner; however the BLM recommends the use of a federally approved repository for storage of any fossils recovered in these efforts.

In many instances where the surface estate is not owned by the Federal Government, the mineral estate is, and is administered by the BLM. Paleontological resources are considered to be part of the surface estate. If BLM is going to approve an action involving the mineral estate that may affect the paleontological resources, the action should be conditioned with appropriate paleontological mitigation recommendations to protect the interests of the surface owner. The surface owner may elect to waive these recommendations; such a waiver must be documented in the casefile.

Cumulative Impacts:

Past and current impacts to important fossil resources could be long-term and significant since fossils removed or destroyed would be lost to science. Impacts to paleontological resources can be reduced to a negligible level through mitigation of ground disturbing activities. It is possible that the proposed activity would have a beneficial impact in that ground disturbing activities may result in the discovery of important fossil resources.

No Action Alternative:

Direct and Indirect Impacts:

None.

Protective/Mitigation Measures:

None.

Cumulative Impacts:

None.

3.4.5. Visual Resources

Affected Environment

The project is located on private land directly adjacent to the Pawnee National Grasslands. The visual resource inventory conducted by the BLM in 2015 identified that the project area inventoried as class IV. Class II being the highest valued and Class IV the lowest. This score is based on a combination of factors including distance from key viewing areas such as major travel corridors, scenic quality of the landscape, and viewer sensitivity. While the project area is not near any major travel corridors and is relatively monotonous with little variation in color or topography the inventory did conclude that viewers are sensitive to change in this area. The inventory identified that their is a public concern that development of oil and gas is having a cumulative affect on the visual resources of the area.

Environmental Effects

Proposed Action:

Direct and Indirect: The proposed action would introduce several small scale human disturbances on the landscape in association with oil and gas development. These disturbances include construction of a road and a well pad as well as production structures typical of a oil and gas development such as tanks and pump jacks. These structures would likely contrast with the surrounding natural landscape however they would likely be absorbed by the expansiveness of the area and not be readily noticeable. Additionally there is other oil and gas production in the area which viewers have become accustomed to. This project would have negligible direct and indirect impacts to visual resources.

Protective/Mitigation Measures: To reduce impacts to visual resources it is recommended that facilities be painted an environmental color that blends with the natural environment and that facilities are located so they are less visible and not skylined on the horizon.

Cumulative Impacts: As identified in the affected environment the visual resource inventory conducted by the BLM found that their is increasing public concern about the cumulative affect that oil and gas development is having on this region of Colorado. The proposed action will contribute additional man-made structures to the landscape contributing to the overall cumulative impacts on visual resources in this area.

3.4.6. Wastes, Hazardous and Solid

Affected Environment:

It is assumed that conditions associated with the proposed project site, both surface and subsurface, are currently clean and that there is no known contamination. A determination will be made by the operator prior to initiating the project, if there is evidence that demonstrates otherwise (such as solid or hazardous wastes have been previously used, stored, or disposed of at the project site).

Nothing in the analysis or approval of this action by BLM authorizes or in any way permits a release or threat of a release of hazardous materials (as defined under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq., and its regulations) into the environment that will require a response action or result in the incurrence of response costs.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts: Possible contaminant sources associated with the drilling operations are:

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

Protective/Mitigation Measures:

The following mitigation will assist in reducing potential spills resulting in 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.

Cumulative Impacts:

Cumulative impacts will be reduced to negligible if protective mitigation measures are followed.

No Action Alternative:

Direct and Indirect Impacts

None.

Protective/Mitigation Measures:

None

Cumulative Impacts:

None.

3.5. Cumulative Impact Summary

The proposed project is located in Weld County, Colorado. Weld County's economy is based primarily on Oil and Gas development and crop and livestock production. Due to this, much of the natural landscape of Weld County has been modified. Weld County has by far more Oil and Gas wells than any other county in Colorado, with over 22,000 active oil and/or gas wells. The vast majority of these wells are located on privately owned surface and produce entirely privately owned minerals. Because of the comparatively small number of federally owned mineral parcels in this area, the cumulative impact of the drilling and operation of this one well would add incrementally to the cumulative impacts of oil and gas development in Weld County. These include minor impacts to air, fluid minerals (geology), soils, vegetation and wildlife.

The area currently has a high degree of alteration in the form of agricultural fields, roads, houses, and oil and gas production. The addition of the infrastructure needed to construct and drill the additional pad and well would have a cumulative impact to the area's air quality; however, given the existing level of development in the area, the proposed action's impacts would be very minor. In the long term, if economical quantities of oil and gas are found and /or produced, additional wells can be expected to be drilled on Federal, State, and private lands. This could result in additional impact to air quality in the future.

Geology (Fluid Minerals): Cumulative impacts on geology and minerals resources would primarily occur as a result of development, which would irreversibly deplete recoverable hydrocarbons from the producing formation.

Soils: The area around the proposed wells has a variety factors effecting soils including other oil and gas development (most of which is non-federal), roads, housing, agriculture, and livestock grazing. The addition of the infrastructure needed to drill the pads would have an additional impact to the areas soils. In the long term, if economical quantities of oil and gas are found,

additional wells can be expected to be drilled. This could add a large amount of disturbance that could have a larger impact on soils in the future.

Vegetation: Pad construction for the project would result in a slight reduction in native vegetation in the general project area, however, much of the vegetation in the project area is already highly modified as a result of oil and gas and agricultural activities.

Sensitive Species: Cumulative effects would occur for mountain plover, long-billed curlew ferruginous hawk, golden eagle, burrowing owl, black-tailed prairie dog, andswift fox given the spatial extent and intensity of oil and gas development, agricultural production, housing developments in the vicinity of the proposed action area. The cumulative effects felt would be similar to those described above, but at a much broader portion of the species' range. In addition, it can be assumed that to some degree these BLM sensitive species would avoid oil and gas developments even after construction is completed and lands are reclaimed.

Terrestrial Wildlife & Migratory Birds: Cumulative effects to these species and individual birds could be felt due to the large extent to which surrounding lands are developed for oil and gas, as well as for agricultural production, housing developments, etc. Since most of the surrounding lands are privately owned, there would be little protection under the Migratory Bird Treaty Act for these species from these non-federal activities.

Overall, this particular proposed application for permit to drill would not affect the population at the planning area, nor cause a trend towards listing.

Visual Resources: The BLM's 2015 visual resource inventory found that their is increasing public concern about the cumulative affect that oil and gas development is having on the visual resources of this region of Colorado. The proposed action will contribute additional man-made structures to the landscape contributing to the overall cumulative impacts on visual resources in this area.

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Chapter 4 Consultation and Coordination

4.1. List of Preparers and Participants

Please see Interdisciplinary Team Review Table for BLM participants.

4.2. Tribes, Individuals, Organizations or Agencies Consulted

The following tribes were consulted:

Apache Tribe of Oklahoma, Cheyenne and Arapaho Tribes of Oklahoma, Cheyenne River Sioux Tribe, Comanche Nation of Oklahoma, Crow Creek Sioux, Eastern Shoshone, Jicarilla Apache Nation, Kiowa Tribe of Oklahoma, Northern Arapaho Tribe, Northern Cheyenne Tribe, the Ute Tribe, Oglala Sioux Tribe, Pawnee Tribe, Rosebud Sioux Tribe, Southern Ute Tribe, Standing Rock Lakota Tribe, and the Ute Mountain Ute Tribe

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Chapter 5 References

Bureau of Land Management. 1986. Northeast Resource Area Management Plan and Record of Decision. Lakewood, Colorado.

Bureau of Land Management. 1991. Colorado Oil and Gas Leasing Environmental Impact Statement. Lakewood, Colorado.

Bureau of Land Management. 2008 H-1790-1 National Environmental Policy Handbook. Washington, D.C.

Bureau of Land Management. 2015. Visual Resource Inventory; Royal Gorge Field Office. Canon City, Colorado.

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Finding of No Significant Impact

Based on review of the EA and the supporting documents, I have determined that the project is not a major federal action and will not have a significant effect on the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects from any alternative assessed or evaluated meet the definition of significance in context or intensity, as defined by 43 CFR 1508.27. Therefore, an environmental impact statement is not required. This finding is based on the context and intensity of the project as described below:

RATIONALE:

Context: The BLM RGFO has received one Application for Permit to Drill (APD), proposing drilling, completion and operation of one horizontal federal oil well. An access road and well pad will be constructed on fee surface over fee minerals (adjacent to the federal lease) in order to drill, complete and operate the well. Since all surface activity and related disturbance is taking place on private surface, off of the federal lease, BLM has limited authority over the actions that take place on the surface, including authority to impose certain mitigation measures (as COAs to the approved APD) pertaining to the surface management of the well site.

The projects are located on rangeland in Northeast Weld County approximately 2.5 miles southeast of the town of Keota, Colorado. The federal mineral estate that will be accessed by the wells is leased and subject to oil and gas development. All surface activities related to these actions will take place on privately owned surface over federal minerals (off lease), there is no public access to the project area.

Extensive oil and gas development has occurred in the area, mostly on private (fee) surface and private (fee) mineral estate.

Intensity:

The potential intensity/severity of the impacts anticipated from the Sonic Star 1–12–8–60 APD were considered for each of the ten areas suggested for consideration by the CEQ. With regard to each:

Impacts that may be beneficial and adverse:

There would be minor impacts to air quality from the proposed wells. Most of this would occur during the drilling phase. Potential impacts might occur to ground and surface water; however such impacts should not occur if the required drilling requirements and regulations are followed. Impacts to surface water and soils may occur, but will be mitigated or eliminated due to regulations and operator committed BMPs. Other minor impacts might occur to migratory birds but would be mitigated through the use of a timing limitation. Positive impacts include benefits in royalties and revenue generated to the federal government from productive wells. Other indirect effects could include effects due to overall employment opportunities related to the oil and gas and service support industry in the region as well as the economic benefits to state and county governments related to royalty payments and severance taxes. Other beneficial impacts from the action would be the potential for productive wells being created that would add, albeit in a small way to national energy independence.

Public health and safety:

The proposed action will have a temporary negative impact to air quality through the generation of fugitive dust during the construction phase. Utilization of the road, surface disturbance, and construction activities such as drilling, hydraulic fracturing, well completion, and equipment installation will all impact air quality through the generation of dust related to travel, transport, and general construction. This phase will 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 will be reduced to operational and maintenance checks which may be as frequent as a daily visit. Emissions will result from vehicle exhausts from the maintenance and process technician visits. The pad can be expected to produce fugitive emissions of well gas, which contains mostly methane and a minor fraction of volatile organic compounds. Fugitive emissions may also result from pressure relief valves and working and breathing losses from any tanks located at the site, as well as any flanges, seals, valves, other infrastructure connections used at the site. Liquid product load-out operations will also generate fugitive emissions of VOCs and vehicular emissions. If the operator is unable to sell any produced gas from the well, then gas flaring will also produce emissions of criteria, HAP, and GHG emissions.

Unique characteristics of the geographic area:

The EA evaluated the area of the proposed action and determined that no unique geographic characteristics such as: wild and scenic rivers, Areas of Critical Environmental Concern, designated wilderness areas, wilderness study areas or Lands with Wilderness Characteristics; were present. A portion of the proposed pad is on Prime Farmlands if Irrigated, but the project area is not irrigated.

Degree to which effects are likely to be highly controversial:

The potential for controversy associated with the effects of the proposed action is low. There is no disagreement or controversy among ID team members or reviewers over the nature of the effects on the resource values on public land by the proposed action.

Degree to which effects are highly uncertain or involve unique or unknown risks:

The drilling of oil and gas wells has occurred historically over the past century and although the potential risks involved can be controversial, they are neither unique nor unknown. There is low potential of unknown or unique risks associated with this project due to numerous other wells of this type having been successfully drilled, completed and produced in this area of Weld County.

Consideration of whether the action may establish a precedent for future actions with significant impacts:

The proposed APDs will be limited to standard construction procedures associated with pad/road construction and drilling in Weld County and have occurred historically on split and private mineral estate. There are no aspects of the current proposal that are precedent setting.

Consideration of whether the action is related to other actions with cumulatively significant impacts:

The action is a continuation of oil and gas activities that have historically occurred in the area. Continued oil and gas activity in the area will have minor but additive impacts to air and the production greenhouse gas emissions. The project area having been subject to historic drilling

activity will continue to experience gradual depletion of the recoverable oil and gas products. Although past cattle grazing had contributed to cumulative impacts, there have been no other recent activities besides oil and gas that has contributed to cumulative impacts.

Scientific, cultural or historical resources, including those listed in or eligible for listing in the National Register of Historic Places:

A segment of the Burlington and Missouri River Railroad grade (5WL1423.42), which qualifies as a historic property, is present in the area of potential effect (see Report CR-RG-15-46 P). Because the operator is unable to avoid crossing the historic property with an access road, BLM determined that the undertaking has the potential to adversely affect the site. In a Memorandum of Agreement executed on May 18, 2015, among BLM, the Colorado State Historic Preservation Office, the United States Forest Service, and Carrizo (Niobrara) LLC, the parties agreed to stipulations involving installation of a specially-designed ramp to allow traffic to cross the railroad grade, archaeological monitoring during construction of the ramp, and submission of a document narrating the history of the Burlington and Missouri River Railroad, including detailed maps. A copy of the MOA is in the project casefile. Once the stipulations are addressed by the proponent, all adverse effects related to the undertaking will be resolved, and no additional mitigation actions will be required

Threatened and endangered species and their critical habitat:

There are no known populations of T&E species in the action area.

Any effects that threaten a violation of Federal, State or local law or requirements imposed for the protection of the environment: The proposed action conforms with the provisions of NEPA (U.S.C. 4321-4346) and FLPMA (43 U.S.C. 1701 et seq.) and is compliant with the Clean Water Act and The Clean Air Act, the National Historic Preservation Act, Migratory Bird Treaty Act (MBTA) and the Endangered Species Act.

NAME OF PREPARER: Aaron Richter

SUPERVISORY REVIEW: /s/ Jay Raiford

NAME OF ENVIRONMENTAL COORDINATOR: /s/ Martin Weimer

DATE: 1/11/16

SIGNATURE OF AUTHORIZED OFFICIAL: /s/ Keith E. Berger

Keith E. Berger, Field Manager

DATE SIGNED:1/13/16

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DECISION RECORD

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ROYAL GORGE FIELD OFFICE

NEPA Number: DOI-BLM-CO-F02-2015-0022 EA

7.1. Sonic Star 1–12–8–60 APD

DECISION: It is my decision to authorize the Proposed Action as described in the attached EA. The proposed action is the drilling, completion and operation of one horizontal federal oil well. An access road and well pad will be constructed on fee surface over fee minerals (adjacent to the federal lease) in order to drill, complete and operate the well.

The projects are located on rangeland in Northeast Weld County approximately 2.5 miles southeast of the town of Keota, Colorado. The Federal mineral estate that will be accessed by the wells is leased and subject to oil and gas development. All surface activities related to these actions will take place on privately owned surface over federal minerals (off lease), there is no public land or public access in the project area.

The proposed action was analyzed in the Environmental Assessment (EA) DOI-BLM-CO-F02-2015-0022 and a Finding of No Significant Impact was reached and an EIS will not be prepared.

7.2. Rationale:

This project will develop oil and gas resources on Federal minerals Lease COC71628 consistent with existing Federal lease rights provided for in the Mineral Leasing Act of 1920, as amended. Extensive oil and gas development has occurred throughout the project area, mostly on private mineral estate.

The project area currently has a high degree of alteration in the form of agricultural fields, roads, houses, and oil and gas production. The addition of the infrastructure needed to construct and drill the proposed well would have mostly temporary and overall minor impacts on resources present in the project area.

7.3. Mitigation Measures and Monitoring:

Air Quality: In addition to the existing state and federal requirements, the following BLM requirements will apply:

- Use industry best practices, including watering, graveling, and reseeding to reduce fugitive dust emissions from vehicular traffic and disturbed surfaces. Interim reclamation and any existing agricultural practices will be implemented in order to stabilize the site and prevent fugitive dust from being generated. No visible dust plumes should be observed leaving the site.
- All Drill Rigs and Non-Road Engines will be required to meet EPA Non-Road Tier II Emissions Standards, or better, for all drilling and completion operations.

- Process equipment will be permitted by CDPHE in accordance with applicable requirements and required emissions standards to limit the facility's potential to emit and provide appropriate operating, monitoring, and record keeping requirements.

Migratory Birds: Before construction, conduct bird surveys during the breeding season appropriate for the bird species described in this analysis, being between May 20th to July 10th, within a 1/8 mile of the entire project area and to include all proposed construction and activity area. Surveys shall be coordinated with the BLM wildlife biologist and shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 a.m. under favorable conditions, following interior line transects (Hanni 2002) or Monitoring Colorado Bird's (MCB) point transects (Leukering 2000), or other pre-approved protocol. If surveys result in positive detection of breeding migratory birds or raptors, then no vegetation and ground surface-disturbing activities would be allowed for a 60-day period during the core breeding season of these birds to provided limited protection of migratory bird and raptor breeding activities; the 60-day period shall be coordinated with the BLM wildlife biologist to ensure appropriate protections of breeding activity are provided. If raptor nests are detected then a 1/2 mile buffer, or a comparable stipulation depending on the raptor species, would be required. If surveys result in negative detection of breeding migratory birds or raptors, then construction activities could proceed. If bird surveys are not feasible, then no construction or implementation activities would be allowed between May 15th and July 15th to provide limited protection of migratory bird and raptor breeding activities. Vegetation and ground surface-disturbing activities that are initiated prior to March 1st may continue through the breeding season because it is assumed loss of suitable breeding habitat occurred in the project area prior to the start of the bird breeding season, which would preclude these species from nesting in the area.

Any secondary containment system will be covered in a manner to prevent access by migratory birds. The operator will construct, modify, equip, and maintain all open-vent exhaust stacks on production equipment to prevent birds and bats from entering, and to discourage perching, roosting, and nesting. Production equipment includes, but may not be limited to, tanks, heater-treaters, separators, dehydrators, flare stacks, and in-line units. Any action that may result in a "take" of individual migratory birds or nests that are protected by MBTA will not be allowed.

Cultural Resources:

1. The portion of the proposed access road across Site 5WL1423.42 will be constructed to minimize impacts and preserve the physical integrity of railroad grade. Specifically, the access road will be designed using the following approach:

2. Place a non-woven geotextile on top of the existing ground surface (soil and vegetation) over and extending a minimum of 25 ft (7.6 m) on each side of the former railroad grade. The width of the geotextile will extend a minimum of 5 ft (1.5 m) beyond the edge of the proposed access road. The purpose of the non- woven geotextile is to provide a physical barrier between the native land and road fill to ensure only construction-based materials are removed during final reclamation.

3. Construct a soil ramp using fill material placed over the non-woven geotextile. Place a geogrid material on top of the fill material over and extending a minimum of 25 ft (7.6 m) on each side of the former railroad grade. The width of the geogrid will extend a minimum of 5 ft (1.5 m) beyond the edge of the access road. The purpose of the geogrid is to reinforce the soils by allowing the distribution of weight to a larger area thereby reducing the potential for soils to separate under tension.

4. Install 8 inches of compacted aggregate and surface material over the top of the geogrid extending to the width of the access road.

5. An archaeologist that holds a BLM permit in good standing will perform monitoring during the construction of the road over Site 5WL1423.42, as well as when the temporary road is eventually dismantled.

6. The archaeological monitor will be present throughout the construction of the road in the vicinity of the railroad grade, and until in his or her professional judgment, the risk to the historic property is minimal. The archaeological monitor will have the authority to stop the work if undue damage is occurring, and will contact the BLM immediately.

7. Any cultural resource (historic or prehistoric site or object) discovered by the monitor will be immediately reported to the BLM. All operations in the immediate area of the discovery will be suspended until written authorization to proceed is issued by the BLM. An evaluation of the discovery will be made by the BLM to determine appropriate actions to prevent the loss of significant cultural or scientific values. The operator will be responsible for the cost of evaluation and any decision regarding proper mitigation measures will be made by the BLM.

8. Mitigation of the adverse effect to Site 5WL1423.42 will consist of the completion of an expanded Colorado Cultural Resource site form for the Burlington and Missouri River Railroad, including a detailed narrative history and maps that show the entirety of the line. The documentation will not be considered complete until a final draft has been approved by the BLM and SHPO.

Paleontological Resources: The proposed construction of the well pads, access to the well pads, and pipelines may penetrate the protective soil layer impacting the bedrock unit below. Because a highly fossiliferous (Class 5) formation is present and susceptible to adverse impacts, mitigation measures are required. The BLM recommends that a field inventory be performed prior to any surface disturbing activity. Depending on the results of the inventory, monitoring during construction may be recommended. If any significant fossils are found, development of a research design and data recovery may also be recommended before the project proceeds. Any fossils recovered on private land belong to the private landowner; however, the BLM recommends the use of a federally approved repository for storage of any fossils recovered in these efforts.

In many instances where the surface estate is not owned by the federal government, the mineral estate is, and is administered by the BLM. Paleontological resources are considered to be part of the surface estate. If the BLM is going to approve an action involving the mineral estate that may affect the paleontological resources, the action should be conditioned with appropriate paleontological mitigation recommendations to protect the interests of the surface owner. The surface owner may elect to waive these recommendations; such a waiver must be documented in the casefile.

Visual Resources:

To reduce impacts to visual resources it is recommended that facilities be painted an environmental color that blends with the natural environment and that facilities are located so they are less visible and not skylined on the horizon.

Wastes, Hazardous or Solid: The following mitigation will assist in reducing potential spills resulting in 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.

7.4. Appeal or Protest Opportunities:

This decision shall take effect immediately upon the date it is signed by the Authorized Officer, and shall remain in effect while any appeal is pending unless the Interior Board of Land Appeals issues a stay (43 CFR 2801.10(b)). Any appeal of this decision must follow the procedures set forth in 43 CFR Part 4. Within 30 days of the decision, a notice of appeal must be filed in the office of the Authorized Officer at the Royal Gorge Field Office, 3028 E. Main, Cañon City, Colorado, 81212. If a statement of reasons for the appeal is not included with the notice, it must be filed with the Interior Board of Land Appeals, Office of Hearings and Appeals, U.S. Department of the Interior, 801 North Quincy St., Suite 300, Arlington, VA 22203 within 30 days after the notice of appeal is filed with the Authorized Officer.

7.5. Authorizing Official:

/s/ Keith E. Berger 1/13/16

Keith E. Berger Date
Field Office Manager