US. Department of the Interior
Bureau of Land Management

September 2019 Competitive Oil and Gas Lease Sale

DOI-BLM-NV-L000-2019-0002-EA

April 2019

Ely District Office
702 N. Industrial Way
Ely Nevada, 89301
(775)289-1934

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

Preliminary
Environmental Assessment
September 2019 Competitive Oil and Gas Lease Sale

DOI-BLM-NV-L000-2019-0002-EA
April 2019

PREPARING OFFICE

U.S. Department of the Interior
Bureau of Land Management
Ely District Office, Nevada

Table of Contents

Chapter 1. Introduction

1.1. Background Information

It is the policy of the Bureau of Land Management (BLM), as mandated by various laws including the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976 (FLPMA), to make mineral resources available and to encourage their development to meet national, regional and local needs. The BLM Nevada State Office (NVSO) conducts competitive sales for oil and gas lease parcels in the Ely District (District). The NVSO publishes a Notice of Competitive Lease Sale that lists lease parcels to be offered at the sale at least 45 days before it is held. The BLM decides which parcels to offer based on current resource and land use information and the management framework developed in the applicable Resource Management Plan (RMP).

The Ely Resource Management Plan (RMP), signed in August 2008 identified areas closed and open to fluid mineral leasing as well as appropriate stipulations to protect resources of concern, and comply with federal law. All leases are subject to the terms and conditions of the standard lease form and additional stipulations and lease notices as identified in the Ely RMP and applied in this site-specific environmental analysis.

The first oil discovery in Nevada occurred in 1954 in Railroad Valley. Railroad Valley is the predominant area where oil and gas production occurs in Nevada. Nevada's only oil refinery is located in Railroad Valley. Most of the valley lies in Nye County, but it crosses into White Pine County at its northern end. Since 1907, over 970 wells have been drilled in Nevada. This includes about 270 wells drilled since 1986 of which about 50 were producers. The late Tertiary volcanic rocks constitute the main reservoir of the oil fields in the Railroad Valley petroleum province. However, the Chainman Shale and the Pilot Shale of Mississippian age are the potentially oil-bearing formations most often targeted in the majority of the analysis area.

1.2. Purpose and Need for Action

The purpose of the Federal Action is to provide opportunities for private individuals or companies to explore and develop oil and gas resources on specific public lands through a competitive leasing process.

The need for the proposed action is to respond to the nomination of Expressions of Interests (EOIs) for leasing, consistent with the BLM's responsibility under the Mineral Leasing Act (MLA), as amended and modified by subsequent legislation and regulations found at 43 CFR 3100, to promote the development of oil and gas on the public domain. BLM authority for leasing public mineral estate for the development of energy resources, including oil and gas, is described in 43 CFR 3160.0-3. The public, BLM, or other agencies may nominate parcels for leasing.

The MLA established that deposits of oil and gas owned by the United States are subject to disposition in the form and manner provided by the MLA under rules and regulations prescribed by the Secretary of the Interior, where consistent with land use planning, FLPMA and other applicable laws, regulations, and policies.

1.3. Decision to be Made

The Ely District Office will determine whether or not to recommend leasing all or part of the nominated parcels in the upcoming September 2019 Competitive Oil and Gas Lease Sale to the Nevada BLM Deputy

State Director for Minerals Management. The Ely District must also determine which notices and stipulations must be attached to the parcels at the leasing stage in order to help protect resources while allowing for exploration and development of mineral resources. The BLM Deputy State Director of Minerals would make the final decision and sign the Decision Record (DR).

The decision to be made is only to identify which parcels are to be leased and which notices and stipulations must be attached to those parcels. The lease does grant certain rights but it does not authorize any ground disturbance or development of the leased parcels. Any development of the leased parcels would be subject to additional NEPA analysis.

1.4. Conformance, Permits, and Approvals

1.4.1. BLM Land Use Plans

The Proposed Action is in conformance with the Goals and Objectives of the Ely District Record of Decision and Approved Resource Management Plan (BLM 2008a, the Ely RMP), as amended, which are to: "*provide for the responsible development of mineral resources to meet local, regional, and national needs, while providing for the protection of other resources and uses* (page 92)." The RMP also states in part, "*It is BLM policy to apply the least restrictive constraint to meet the resource protection objective* (page 97)." In addition, "*Timing limitations indicate that a leased area generally is open to development activities except during a specified period of time to protect identified resource values such as wildlife* (page 92)." The stipulations for Fluid Minerals Lease Notices in Appendix A, Section 2 of the Ely RMP were updated February 11, 2015 under a maintenance action.

The best available science was used by Resource Specialists to analyze the effects to their respective resources as a result of the Proposed Action. Stipulations were applied based on the analysis in the 2007 Ely Proposed Resource Management Plan/Final Environmental Impact Statement and the 2008 Ely District Record of Decision and Approved Resource Management Plan.

The 2019 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment (GRSG Plan Amendment) amended all BLM land use plans in the areas addressed. Under the 2019 GRSG Plan Amendment, mapped habitat for Greater Sage-Grouse (GRSG) is designated as Priority Habitat Management Area (PHMA), General Habitat Management Area (GHMA), or Other Habitat Management Area (OHMA). The Proposed Action conforms with the following applicable sections of the GRSG Plan Amendment.

GRSG Plan Amendment Section 2.1.6, Management Decisions (MD) for Mineral Resources (MR), Unleased Fluid Minerals include the following MD applicable to oil and gas lease sales in PHMA and GHMA:

> **MD MR 1**: Review Objective SSS 4 and apply MDs Special Status Species (SSS)1 through SSS 4 when reviewing and analyzing projects and activities proposed in GRSG habitat.
>
> **MD MR 3**: In PHMAs, manage oil and gas with major constraints (no-surface occupancy) and timing limitations.
>
> **MD MR5**: In GHMAs, manage oil and gas and geothermal fluid minerals with moderate constraints, timing limitations and controlled surface use stipulations.

GRSG Plan Amendment Appendix E, Fluid Mineral Stipulations, Waivers, Modifications, and Exceptions, specifies the stipulations to apply to each habitat type and describes conditions under which exceptions,

modifications, or waivers may or may not be applied. The stipulations have been applied to each part of a parcel with GRSG habitat, down to the 40-acre quarter-quarter of a section, using the highest applicable level of protection (e.g. if a quarter-quarter section includes PHMA and GHMA, stipulations for PHMA are applied).

This document is tiered to, and incorporates by reference, the Ely Proposed Resource Management Plan/Final Environmental Impact Statement (BLM 2007, the RMP/FEIS), the Ely RMP (2008a) and the 2019 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. This document also incorporates by reference applicable sections of the 2017 Competitive Oil and Gas Lease Sale Environmental Assessment (BLM 2018).

1.4.2. Relationship to Statutes, Regulations or Other Plans

The proposed action is in compliance with federal laws and regulations, Executive Orders, and Department of Interior and BLM policies and is consistent, to the maximum extent possible, with state laws and local and county ordinances and plans, including the following:

- Federal Land Policy and Management Act (1976) as amended and the associated regulations at 43 CFR Part 1600
- Mineral Leasing Act (1920) as amended and the associated regulations at 43 CFR Part 3100
- Federal Oil and Gas Leasing Reform Act of 1987 (Reform Act)
- Energy Policy Act (2005)
- National Environmental Policy Act (1969) and the associated CEQ regulations at 40 CFR Parts 1500 through 1508
- Clean Water Act (1972)
- National Historic Preservation Act (1966) as amended and the associated regulations at 36 CFR Part 800
- Endangered Species Act (1973) as amended
- Bald and Golden Eagle Protection Act (1962)
- Migratory Bird Treaty Act (1918)
- BLM Manual 6840- Special Status Species Management
- Executive Order 2018-32 (2019) Order Establishing Use of the Nevada Greater Sage-grouse Conservation Plan and Credit System
- Secretarial Order 3362 (IB 2019-005) Site-specific Management Activities to Conserve or Restore Big Game Habitat

1.5. Scoping, Public Involvement, and Issues

Internal scoping was conducted on March 25, 2019 by an interdisciplinary team composed of Ely District resource specialists and management who discussed the potential consequences of the proposed action.

The Ely District initiated Native American consultation for the September 2019 Oil and Gas Lease Sale on April 8, 2019. A list of tribes that were sent this consultation request can be found in Section 5.1. In addition, the Ely District informally consulted with the U.S. Fish and Wildlife Service on March 3, 2019.

Preliminary Issues identified during internal scoping are listed below:

- How would the September 2019 lease sale impact air quality and Climate Change?
- How would the September 2019 lease sale impact floodplains?

- How would the September 2019 lease sale impact water quality, surface and ground?
- What impacts would the September 2019 lease sale have on Greater Sage-Grouse and its habitat?
- What impacts would the September 2019 lease sale have on fish and wildlife and special status species and its habitat?
- What Native American concerns are associated with the September 2019 lease sale?
- What impacts relative to hydraulic fracturing are associated with the September 2019 lease sale?
- How would the September 2019 lease sale impact Visual Resource Management?
- How would the September 2019 lease sale impact livestock grazing?
- What impacts would the September 2019 lease sale have on geology and mineral extraction?

There will be a 30-day appeal period upon signature of the Decision Record (DR) by the Deputy State Director of Minerals and Finding of No Significant Impact (FONSI) by the District Manager for the Ely District Office.

Chapter 2. Proposed Action and Alternatives

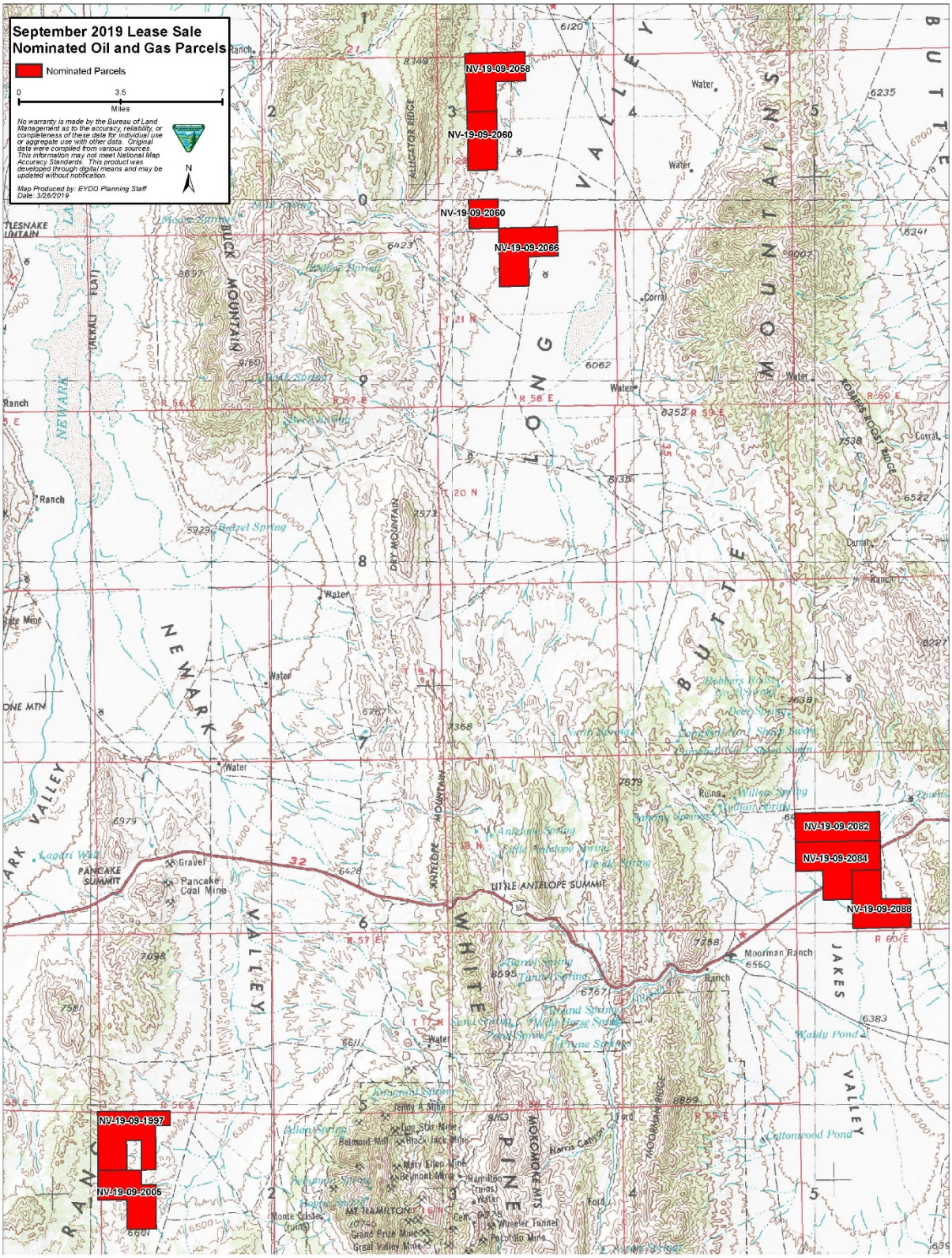
2.1. Description of the Proposed Action

A list of 10 nominated parcels totaling approximately 21,365 acres was submitted to the Ely District on March 4, 2019 (see Map 1). Two of the 10 parcels nominated in the Ely District for the September 2019 sale are analyzed in BLM Battle Mountain District Office June 2019 Competitive Oil and Gas Lease Sale Environmental Assessment (EA), leaving 8 parcels and approximately 16,244 acres analyzed under this EA. The total acreage represents less than one percent of the acres open to leasing in the Ely District. The parcels are located in White Pine County. Appendix C lists all the parcels, the parcel number, acreage, legal description, and Appendix D lists stipulations and notices to be applied to each parcel.

Once sold, the lessee has the ability to develop the lease by exploring, drilling, and producing all of the oil and gas within the lease boundaries, subject to the stipulations and notices attached to the lease (Title 43 CFR 3101.1–2). Leases are issued for a 10 year period and continue for as long thereafter as oil or gas is produced in paying quantities. If a lessee fails to produce oil and gas, does not make annual rental payments, does not comply with the terms and conditions of the lease, or relinquishes the lease; ownership of the lease reverts back to the federal government and the lease can be resold.

All parcels contain a Cultural Resources Lease Notice stating that all development activities proposed under the authority of these leases are subject to compliance with Section 106 of the National Historic Preservation Act (NHPA) and Executive Order 13007. All parcels also contain an Endangered Species Act (ESA) Notice, which requires compliance with Section 7 of the ESA. Standard terms and conditions as well as special stipulations listed in the RMP would also apply.

In order for a lessee to exercise their rights to explore or develop a lease, an Application for Permit to Drill (APD) must be submitted and approved. Additional NEPA analysis is prepared for these site specific plans. Site-specific mitigation measures and Best Management Practices (BMPs) (Appendix D and the Gold Book) would be attached as Conditions of Approval (COAs) for each proposed activity. Any proposed APD would be analyzed under additional project and site-specific analysis per the National Environmental Policy Act (NEPA). The level of further NEPA analysis would depend upon the results of scoping and the particulars of the proposed action.



Map 1 Nominated Parcels within the Ely District for the 2018 Competitive Oil and Gas Lease Sale

2.2. No Action Alternative

Under the No Action Alternative, the BLM would withdraw all 8 lease parcels from the September 2019 lease sale. Surface management would remain the same and ongoing oil and gas exploration and/or development would continue on surrounding leased federal, private, and state lands.

2.3. Alternatives Considered but Not Analyzed in Detail

No other alternatives to the Proposed Action were apparent that would meet the purpose and need of the Proposed Action.

2.4. Reasonably Foreseeable Development Scenario

A Reasonably Foreseeable Future Development scenario (RFFD) for oil and gas is a long-term projection of oil and gas exploration, development, production, and reclamation activity. The RFFD covers oil and gas activity in a defined area for a specified period of time and provides the basis for the analysis of the environmental effects in Chapter 3 of this document. The RFFD scenario was developed based on past exploration activities and estimates of future exploration and development activity given the potential occurrence of resources (BLM 2007; page 4.18–3). This document incorporates by reference the December 2018 Competitive Oil and Gas Lease Sale Final Environmental Assessment, Section 2.4, which contains a description of the RFFD and the assumptions made for the development of the Ely RMP RFFD. The document incorporated by reference defines the general assumptions, and assumptions for exploration drilling and production and well stimulation. A detailed discussion of hydraulic fracturing is included as Appendix F.

Chapter 3. Affected Environment and Environmental Effects

3.1. Introduction

This chapter presents the existing environment (i.e., the physical, biological, social, and economic values, and resources) of the impact area, the issues analyzed, the impacts to the analyzed resources, and project design features that would be carried forward into the Decision Record as conditions of approval of the proposal.

While many potential issues may arise during scoping, not all of them warrant analysis. Issues raised through scoping are analyzed if:

- Analysis of the issue is necessary to make a reasoned choice between alternatives;
- The issue is significant (e.g. an issue associated with a significant impact, such as a potential violation of a law imposed to protect the environment); and/or
- Analysis of the issue is necessary to determine if the direct or indirect impacts are themselves significant, or if it would add a measurable incremental impact to past, present and reasonably foreseeable actions that could have a cumulatively significant impact.

Potential impacts to the following resources/concerns were evaluated in accordance with criteria listed above to determine if detailed analysis was required. Consideration of some of these items is to ensure compliance with laws, statutes or Executive Orders that impose certain requirements upon all Federal actions. Other items are relevant to the management of public lands in general, and to the Ely District BLM in particular.

Many times a project would have some degree of effect upon a resource or concern, but that effect doesn't approach any threshold of significance, nor does it increase cumulative impacts by a measurable increment. Such effects are described as "negligible" in the rationale for dismissal from analysis.

The following table documents the issues evaluation or rationale for dismissal from analysis:

Table 3.1 Resources Considered (Supplemental Authorities)

Resources	Not Present	Present/Not Affected	Present/May be Affected	Rationale
Air Quality and Climate Change			√	See Sections 3.3.1 and 4.3.1
Special Designation Management: ACEC, National Monument, Wild and Scenic Rivers	√			The proposed lease parcels are not located in or near any areas of special management designation, ACEC, National Monument, or Wild and Scenic Rivers.
Cultural Resources and Heritage Special Designations			√	See Section 3.3.2 and 4.3.2
Environmental Justice and Socioeconomic Values	√			There are no Environmental Justice populations in the project area. Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Socioeconomic Values is not an issue and therefore is not analyzed in detail.
Soil Resources: Prime and Unique Farmlands	√			There are no Prime or Unique Farmlands, as defined by the Farmland Protection Policy Act, in the project area.
Floodplains			√	See Sections 3.3.3 and 4.2.3
Forests/Woodland Products and Rangelands (Healthy Forest Restoration Act Only)		√		Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Forests/Woodland Products and Rangelands is not an issue and therefore is not analyzed in detail.
Human Health and Safety		√		Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Human Health and Safety is not an issue and therefore is not analyzed in detail. Any potential impacts from subsequent exploration and development activities would be analyzed on a separate, additional site-specific analysis.
Migratory Birds			√	A Lease Notice regarding the Migratory Bird Treaty Act has been included on all parcels. A detailed analysis is not included due to application of design features.

Native American Religious Concerns		√		The BLM Ely District Office, Bristlecone Field Office, reached out to federally recognized tribes, in compliance with Executive Order 13175 Consultation and Coordination with Indian Tribal Governments, by sending consultation letters seeking input on April 4, 2019. No potential issues with the Proposed Action have been brought forward at this time.
Non-Native Invasive and Noxious Species		√		Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Non-Native Invasive and Noxious Species is not an issue and therefore is not analyzed in detail. Any potential impacts from subsequent exploration and development activities would be analyzed on a separate, additional site-specific analysis.
Threatened or Endangered Species			√	See Sections 3.3.6 and 4.3.5
Wastes, Hazardous or Solid			√	See Sections 3.3.10 and 4.3.9
Water Quality, Surface and Ground			√	See Sections 3.3.4 and 4.3.4
Wetland and Riparian Zones	√			There are no Wetlands and Riparian Zones in the project area.
Wilderness and Wilderness Study Areas (WSAs)	√			None of the proposed parcels are within a designated Wilderness or WSA.
Lands with Wilderness Characteristics	√			None of the proposed parcels occur within Lands with Wilderness Characteristics.

Table 3.1 Resources Considered

Other Resources	**Not Present**	**Present/Not Affected**	**Present/May be Affected**	**Rationale**
Fire Management		√		Standard fire management stipulations would be included in any lease sale. Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Fire Management is not an issue and therefore is not analyzed in detail. Any potential impacts from subsequent

				exploration and development activities would be analyzed on a separate, additional site-specific analysis.
Vegetation Resources		√		Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Vegetation Resources is not an issue and therefore is not analyzed in detail. Any potential impacts from subsequent exploration and development activities would be analyzed on a separate, additional site-specific analysis.
Fish and Wildlife			√	See Sections 3.3.5 and 4.3.5
Special Status Species			√	See Sections 3.3.6 and 4.3.5
Wild Horse and Burro		√		Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Wild Horse and Burro is not an issue and therefore is not analyzed in detail. Any potential impacts from subsequent exploration and development activities would be analyzed on a separate, additional site-specific analysis.
Paleontological Resources		√		The Paleontological resources lease notice would be included in any lease sale. Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Paleontological Resources is not an issue and therefore is not analyzed in detail. Any potential impacts from subsequent exploration and development activities would be analyzed on a separate, additional site-specific analysis.

Lands and Realty		√		Some of the proposed lease parcels include pre-existing land use authorizations such as grants, leases, and permits. Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Lands and Realty is not an issue and therefore is not analyzed in detail. Any potential impacts to pre-existing land use authorizations from subsequent exploration and development activities would be analyzed under a separate, additional site specific analysis.
Travel Management		√		Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Travel Management is not an issue and therefore is not analyzed in detail. Any potential impacts from subsequent exploration and development activities would be analyzed on a separate, additional site-specific analysis.
Visual Resources Management			√	See Sections 3.3.7 and 4.3.6
Recreation		√		Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Recreation is not an issue and therefore is not analyzed in detail. Any potential impacts from subsequent exploration and development activities would be analyzed on a separate, additional site-specific analysis.
Livestock Grazing			√	See Sections 3.3.8 and 4.3.7
Geology and Mineral Extraction			√	See Sections 3.3.12 and 4.2.9
Emergency Stabilization and Restoration		√		Analysis at the leasing stage is based off the RFFD scenario due to uncertainty regarding future development that would occur. Emergency Stabilization and

				Restoration is not an issue and therefore is not analyzed in detail. Any potential impacts from subsequent exploration and development activities would be analyzed on a separate, additional site-specific analysis.

3.2. General Setting

There are no known oil reserves within any of the proposed parcel areas. The oil-bearing formations sought in White Pine County are primarily the Chainman and Pilot shales. Devonian-age subthrust structures, thought to be present in some valleys within the analysis area, are also targeted. The nominated parcels have been separated into 3 groups by geographic area and similar resource concerns (see Chapter 2 – Map 1). The total area of all the parcels is approximately 16,244 acres. All 8 parcels are located within the Bristlecone Field Office boundary.

Group 1 is located in Long Valley, west of the Butte Mountain Range. This group contains 3 parcels totaling 5,762.01 acres.

Group 2 is located in Jakes Valley, east of the Butte Mountain Range. This group contains 3 parcels totaling 6,344.60 acres.

Group 3 is located in Newark Valley, partially within the Pancake Mountain Range. This group contains 2 parcels totaling 4137.62 acres.

3.3. Resources

The following sections evaluate resources for the potential for significant impacts to occur, either directly or indirectly, due to implementation of the proposed action. Potential impacts were evaluated to determine if detailed analyses were required. Consideration of some of these items is to ensure compliance with laws, statues or Executive Orders that impose certain requirements upon all federal actions. Other items are relevant to the management of public lands in general, and to the Ely District in particular. Table 3.1 lists any resources and rationale for not being carried forward for analysis as well as those that are carried forward.

At the time of this review, it is not known whether all nominated parcels would be offered for lease, would receive bids, would be issued leases, or what type of exploration or development would be proposed in the future. Detailed site-specific analysis of individual pads, wells, ancillary facilities, or roads would occur when an APD is submitted.

3.3.1. Air Quality and Climate Change

Much of the information in this section is incorporated by reference from the 2017 U.S. Department Interior Bureau of Land Management Competitive Oil and Gas Lease Sale Final Environmental Assessment (EA), Section 3.3.1 Air Quality and Climate Change, pages 25 through 31 (BLM, 2018). The section as referenced describes potential adverse atmospheric and related potential health effects due to air quality impacts from oil and gas development, and describes how the generation of greenhouse gases from oil and gas development can contribute to climate change. The physiography of the parcels analyzed in the 2017 EA is similar to those currently under analysis within this EA. As such, the impacts to air quality and climate

change from future oil and gas development as described in the 2017 EA will be the same for any future development that may take place on the lease parcels currently under analysis within this EA.

Affected Environment

The U.S. Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for criteria pollutants, including carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). In addition to the criteria pollutants, regulations also exist to control the release of hazardous air pollutants (HAPs), 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 EPA has delegated regulation of air quality under the federal Clean Air Act to the State of Nevada. Ambient air quality in the affected environment is demonstrated by monitoring for ground-level atmospheric air pollutant concentrations. The ambient air measurements show that the existing regional air quality is in attainment, meaning that concentrations for all the criteria pollutants are below the applicable state and federal ambient air quality standards. For more information on pollutant monitoring values, please visit the EPA's AirData website at www.epa.gov/airdata.

Environmental Effects

Proposed Action

While the act of leasing the parcels would produce no substantial air quality effects, potential future development of the leases could lead to increases in local and regional emissions. Since it is unknown if the parcels would be developed, or the extent of the development, it is not possible to reasonably quantify potential air quality effects through dispersion modeling or another applicable method at this time. Further, the timing, construction and production equipment specifications and configurations, and specific locations of activities are also unforeseeable at this time.

Effects to air quality from lease development include potential increases in fugitive dust and potentially inhalable particulate matter (specifically PM_{10} and $PM_{2.5}$) in the project area and immediate vicinity. Particulate matter may become airborne when drill rigs and other vehicles travel on dirt roads to drilling locations. Air quality may also be affected by exhaust emissions from engines used for drilling, transportation, gas processing, compression for transport in pipelines, and other uses. These sources would contribute to potential short and long term increases in the criteria pollutants and HAPs. Other pollutants such as carbon dioxide, methane and nitrous oxide could also be emitted.

The air effects described above would be addressed in a subsequent analysis when lessees file an Application for Permit to Drill (APD). All proposed activities including, but not limited to, exploratory drilling activities would be subject to applicable local, state, tribal and federal air quality laws and regulations.

No Action Alternative

The No Action Alternative would have no impacts on the existing air quality in the area. Activities on currently leased parcels adjacent to the proposed parcels would remain on-going as permitted on surrounding federal, state, and private lands.

3.3.2. Cultural Resources

Cultural resources include, but are not limited to rock art, Paleo-Indian and other prehistoric habitation sites, utilized rock shelters and caves, historic cemeteries, mines, town sites and dwellings.

Affected Environment

Any program, activity, or project has an effect on a cultural resource if it alters any of the characteristics or criteria that may qualify the resource for inclusion on the National Register of Historic Places (NRHP) or otherwise affects a cultural property's legally protected status. Impacts to cultural properties are considered adverse if the effect diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Negative or adverse effects can include, but are not limited to: physical destruction of, or damage to, all or part of a property; alteration of a property (e.g., restoration, rehabilitation, stabilization); removal of a property from its historic location; or, transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation (Ely RMP).

The cultural landscape on the Ely District provides evidence of a long history of human occupation. The earliest commonly accepted time frame for prehistoric human presence in Nevada is approximately 10,000 to 11,000 years before present. The region has been consistently, though not densely, populated up to the present day. The prehistoric and historic cultural landscape encompasses artifacts, features, sites, and districts. These evidence classes relate to prehistoric subsistence, lifeways, cultural affiliation, and historic settlement of Nevada that includes mining, ranching, and agriculture.

Environmental Effects

The lease of oil and gas parcels does not entail ground disturbing activities as part of the undertaking. Therefore, this undertaking would not result in impacts to cultural resources. All ground disturbing actions associated with the development of a lease after it has been sold would require additional NEPA and NHPA section 106 compliant Class III survey analysis. Lease Notices and Stipulations are found in Appendix C. Notices are included with all parcels and Stipulations are also included with parcels that have known NRHP eligible cultural resource sites. As required by law, prior to any development, cultural resources would be evaluated in future NEPA analysis and adverse effects would be mitigated prior to ground disturbance for those resources eligible for listing on the NRHP.

The lease of oil and gas parcels does not entail ground disturbing activities as part of the undertaking. Therefore, this undertaking would not result in impacts to Heritage Special Designated areas.

Oil and gas exploration and development activities within one mile of the Lincoln Highway, Pony Express, California Trail, Sunshine Locality, and Honeymoon Hill ACEC would undergo a visual assessment in conjunction with additional NEPA review at the APD stage to determine if the activity would adversely affect the visual integrity of these sites. Mitigation would take place as necessary to maintain the management corridor in as natural a condition as possible.

Proposed Action

Most Lease Sale parcels have not been thoroughly ground surveyed. Those parcels that have been surveyed would require an updated survey. It should be expected that undocumented additional NRHP eligible sites would be discovered when the surveys are completed. All Lease Sale parcels would come with a Notice of

possible National NRHP eligible sites present and mandate an individual EA, including NHPA Section 106 compliant Class III survey analysis, before any ground disturbance.

No Action Alternative

The No Action Alternative would not impact cultural resources or Heritage Special Designated areas.

3.3.3. Floodplains

Affected Environment

For administrative purposes, the 100-year floodplain serves as the basis for floodplain management on public lands. The Federal Emergency Management Agency (FEMA) designates areas with a 1% chance to be flooded during a 100-year, 24-hour runoff event as Zone A and Zone AE flood hazard areas. Areas identified within Zone A or AE flood hazard areas would be subject to federal regulation and mitigation. However, FEMA flood mapping data is not yet available for most of White Pine County to indicate such designations. FEMA gives a Zone D classification to areas such as these where there are possible but undetermined flood hazards, because no analysis of flood hazards has been conducted. All of the parcels under consideration for this analysis fall under the Zone D classification.

Environmental Effects

Proposed Action

While the act of leasing the parcels would produce no ground-disturbing effects within floodplain areas, activities related to lease parcel development can impact the soils of floodplains, making them more susceptible to erosion during flood events or slowing floodwater infiltration through soil compaction. Oil and gas lease stipulation #NV-L-10-C-NSO in Appendix A.2 of the Ely RMP/FEIS, as amended, prohibits any surface occupancy for oil and gas on 100-year flood plains of major rivers that have a one percent chance of flooding in any given year.

No Action Alternative

The No Action Alternative would have no impacts on floodplains in the area. Activities on currently leased parcels adjacent to the proposed parcels would remain on-going as permitted on surrounding federal, state, and private lands.

3.3.4. Water Quality, Surface and Ground

Affected Environment

Water Quality

Water Quality in Nevada is monitored by the Nevada Division of Environmental Protection (NDEP). NDEP has established water monitoring control points at selected locations throughout the hydrographic regions of Nevada. At these control points NDEP specifies the Nevada Water Quality Standards and makes them available in Nevada Revised Statute NRS 445A.1242. These standards apply to all surface water in the watershed upstream from the control point. NDEP also oversees groundwater quality by laying out the standards required for remediation of groundwater contamination.

The Ely RMP requires that authorized activities on public lands do not degrade water quality. This includes compliance with the federal Clean Water Act and Nevada Water Pollution Control Regulations (Nevada Revised Statute 445A). RMP objective WR-2 also requires the integration of land health standards, best management practices, and appropriate mitigation measures into authorized activities to ensure water quality meets Nevada requirements and meets the BLM resource management objectives laid out in BLM Manual 7240. Additionally, any water used for exploration or production of oil and gas resources would need comply with BLM Manual 7250 and Nevada Water Law to ensure that the use does not to impact other water right holders.

Groundwater Resources

Groundwater in Nevada comes from water stored in aquifers composed of alluvium, carbonate, and volcanic rock units. These aquifers are contained within hydrographic basins, which are the basic management unit used by the Nevada Division of Water Resources (Table XX). Parcel group 1 is located in hydrographic basin 175 (Long Valley), group 2 is located in basin 174 (Jakes Valley), and group 3 is in basin 154 (Newark Valley).

The carbonate bedrock aquifers are part of a deep, widespread aquifer system known as the Basin and Range carbonate-rock aquifer system (Welch et al., 2007). Though the carbonate aquifers can have a high capacity to transmit water, they are not widely used as a groundwater resource owing to the fact that, with a few exceptions, they are too deep for reasonable access in most places. Thus, the majority of groundwater use comes from wells drilled into the alluvium aquifers, which are relatively shallow and composed of unconsolidated sediments eroded from elevated rock exposed in the mountain ranges and transported into the valleys by water and gravity. These aquifers also readily transmit water, exist in all of Nevada's drainage basins, and collectively make up what is called the Great Basin alluvial aquifer system (Heilweil and Brooks, 2011). Volcanic rocks underlying the basin fill sediments are not as widespread and tend not to yield the groundwater volumes that the carbonate and alluvium aquifers produce (Welch, et al., 2007).

Table 3.2 Hydrographic Basin Summary

Basin #	Basin Name	Hydrographic Region	Designated Basin (Y/N)[a]	Perennial Yield (Acre-Feet/Year)	Groundwater Appropriations (Acre-Feet/Year)
154	Newark Valley	Central	N	18,000	27,656
174	Jakes Valley	Central	N	12000	29
175	Long Valley	Central	N	6,000	5,078

[a]Designated groundwater basins are basins that the Nevada State Engineer (NSE) declares as designated by order because permitted groundwater rights approach or exceed the average annual recharge, and where the water resources are being depleted or require additional administration. State-declared preferred uses may include, among others, municipal, domestic, and agriculture. The NSE has additional authority to administer water resources in a designated groundwater basin.

Surface Water Resources

Surface water resources in the analysis area include intermittent and ephemeral streams, periodically inundated playas, springs, and constructed impoundments. None of the parcels contain perennial streams. Most streams in the analysis area are ephemeral and flow from the mountains during precipitation and snowmelt events and seep into the basin alluvium or are diverted for irrigation.

Environmental Effects

Proposed Action

Water Quality

The lease of parcels and issuance of oil and gas permits is strictly an administrative action. The act of offering, selling, and issuing federal oil and gas leases does not produce impacts to water quality. Potential on-the-ground impacts would not occur until a lessee applies for and receives approval of their APD on the lease. Prior to APD approval, site-specific NEPA analysis is required to analyze potential impacts to water quality. Additionally, water for any development activity would either come from private sources or would have to have water rights permitted by the NSE.

Groundwater Resources

Impacts to groundwater resources that could occur following an APD approval include introduction of drilling fluids into groundwater, contamination of groundwater from petroleum and other chemicals through spills, well casing leaks, and pipeline leaks, and loss of hydraulic fracturing (HF) fluids into groundwater during HF operations. Similarly, improper construction and management of reserve and evaporation pits can impact ground water quality through leakage and leaching. To safeguard against these kinds groundwater impacts, authorization of the proposed projects would require compliance with local, state, and federal directives, regulations, permitting, and stipulations that relate to groundwater protection, as well as federal and State of Nevada guidelines for hydraulic fracturing. Site-specific NEPA analysis of the potential for groundwater impacts would be conducted prior to any approval for an APD.

Surface Water Resources

Impacts to surface water resources that could occur following an APD approval include alterations to the hydrologic regime such as increased salt and sediment loads during runoff events, increased erosion during construction phases, and alteration of overland flow patterns and groundwater recharge rates from clearing, grading and soil stockpiling activities. Chemicals on the surface associated with development projects could be delivered along with sediments into natural drainage channels and delivered downstream.

Implementation of Best Management Practices along with compliance with state and federally-imposed sedimentation and runoff control measures would be required to effectively prevent project-related transport and delivery of sediments or fluids that may impair surface water resources. Site-specific NEPA analysis of the potential for surface water impacts would be conducted prior to any approval for an APD.

No Action Alternative

The No Action Alternative would have no impacts on water quality and surface and groundwater in the area. Activities on currently leased parcels adjacent to the proposed parcels would remain on-going as permitted on surrounding federal, state, and private lands.

3.3.5. Fish and Wildlife

Affected Environment

The oil and gas parcels are expected to provide habitat for numerous wildlife species. Common big game species that inhabit a portion or all of the proposed lease areas include pronghorn antelope, Rocky Mountain

elk, and mule deer. Migratory birds protected under the Migratory Bird Treaty Act (MBTA) that occupy the parcels would be protected by standard lease notices attached in Appendix D.

According to a GIS analysis using NDOW big game data, there is approximately 2,800 acres of year round Rocky Mountain elk habitat within the parcels. There is approximately 3,430 acres of mule deer habitat within the parcels. Of this, approximately 1,000 acres has been identified as year round habitat and 2,400 acres as winter range. Additionally, there is approximately 18,250 acres of pronghorn habitat. Of this, approximately 15,900 acres is year round habitat and 2,350 acres is winter habitat. According to the analysis, there is no critical big game habitat within or near the parcels.

Table 3.3. Big game habitat within parcels.

Species	Habitat	Approx. Acres	NV-19-09-1997	NV-19-09-2005	NV-19-09-2058*	NV-19-09-2060*	NV-19-09-2066*	NV-19-09-2082*	NV-19-09-2084*	NV-19-09-2088*
Mule deer	Year round	1,040	X	X						
	Winter	2,390			X	X				
Pronghorn	Year round	15,900	X	X	X	X		X	X	X
	Winter	2,350				X	X			
Rocky Mountain elk	Year round	2,810			X	X		X	X	X

* Parcels within Nevada Management Area 10 as directed by Secretarial Order 3362.

Six of the parcels lie within a designated big game winter and migration area, Nevada Management Area 10, as identified by the Secretarial Order 3362 entitled "*Site-specific management activities to conserve or restore big game habitat.*" This Secretarial Order emphasizes the importance of conserving and improving elk, mule deer, and pronghorn habitat and directs the BLM to "appropriately apply site-specific management activities, as identified in State land use plans, site specific plans, or the Action Plan that conserve or restore habitat necessary to sustain local and regional big-game populations…"

Some other wildlife species that inhabit the lease areas include mountain lions, bobcats, coyotes, jackrabbits, cottontails, badgers, and numerous birds, reptiles, and small mammals.

Environmental Effects

Proposed Action

There would be no direct effects from issuing new oil and gas leases because leasing does not directly authorize oil and gas exploration and development activities. Direct impacts from these activities would be analyzed under a separate site-specific NEPA analysis. The RFFD scenario is the basis for indirect future or potential impacts that could occur once the parcels are leased. General short term and long term impacts of oil and gas to general wildlife species are discussed in the Ely RMP/EIS (2007) in Section 4.6 Fish and Wildlife on pages 4.6-14 – 4.6-15. Short term impacts analyzed in the Ely RMP include vegetation loss, habitat fragmentation, wildlife displacement, and increased noise and human presence. Long term impacts analyzed in the Ely RMP include irretrievable loss of habitat, change in vegetation composition, and habitat fragmentation and wildlife displacement.

Under the RFFD scenario, 9,807 acres (short and long-term disturbance) are anticipated to be disturbed, with the disturbance most likely dispersed throughout the nominated 16,244 acres. Short-term and long-term impacts to overall habitat and species populations are anticipated to be negligible.

No Action Alternative

Under the No Action Alternative, the lease sale would not occur, and impacts to fish and wildlife would remain the same.

3.3.6. Special Status Species

Affected Environment

BLM Manual 6840 entitled Special Status Species Management states the BLM special status species are those that 1) are listed or proposed for listing as endangered or threatened under the Endangered Species Act (ESA), and 2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, which are designated as Bureau Sensitive by the State Director(s). Additionally, all federal candidate species, proposed species and delisted species in the five years following delisting would be conserved as Bureau sensitive species.

A GIS analysis was conducted using data from NDOW, BLM, US Fish and Wildlife Service, and the Nevada Natural Heritage Program to determine locations of special status species in relation to the leased parcels. Table B1 in Appendix B indicates which groups contain or are immediately adjacent to habitat for BLM special status species. When evaluating aquatic species, the review extends out to the hydrobasin. An additional review of special status species would occur when an APD is submitted and may result in subsequent surveys of sensitive species. There are no federally listed species within the parcels or within the hydrobasins of the parcels.

Greater sage-grouse habitat comprises a portion of all parcel groups. Based on the Greater Sage-grouse Plan Amendment (2019), parcel groups contain Other (~800 acres), General (~3,500 acres) or Priority Habitat Management Areas (~11,430 acres; OHMA, GHMA, PHMA respectively). The proposed leased parcels contain important nesting and early brood-rearing (~11,600 acres), summer (~10,630 acres), and/or winter habitat (~14,200 acres) for Greater sage-grouse. There are currently five active leks that are within 4 miles of the parcels. Maps A11 – A14 in Appendix A display Greater sage-grouse Habitat Management Areas and the seasonal habitats in relation to the proposed lease parcels.

Environmental Effects

Proposed Action

Impacts would be similar to those described under the Fish and Wildlife Section (3.3.5) of this document such as habitat loss and/or degradation or displacement from noise and human presence. Because of the highly specialized and endemic nature of some special status species, additional mitigation may be needed at the exploration and development stages.

Notices and timing stipulations would minimize some effects to special status species. For example, the raptor nest site timing stipulation would minimize effects to Northern goshawk, golden eagle, western burrowing owl, ferruginous hawk, and peregrine falcon during the breeding season. Priority Habitat Management Areas for Greater sage-grouse is covered by a No Surface Occupancy stipulation. A 3% disturbance cap for PHMA would be calculated during the development phase if a lessee were to request an exception from the No Surface Occupancy stipulation. New development would not exceed the 3% disturbance cap protocol at the project scale in PHMA, except in situations where a net conservation gain

to the species is achieved as a component of compliance with a state mitigation plan, program, or authority, such as required by the State of Nevada's Executive Order 2018-32 (and any future regulations adopted by the State of Nevada regarding compensatory mitigation, consistent with federal law). Additional mitigation measures for Greater sage-grouse would include the Adaptive Management Plan as provided in Appendix D of the Plan Amendment (BLM 2019).

Oil and gas exploration, and production activities, as outlined in the RFFD scenario, have the potential to affect sensitive vegetation by reduction or loss in production, distribution, and vigor of sensitive plant communities due to oil and gas activities. Additionally, ground disturbance and activities associated with oil and gas have the potential to introduce invasive plant species to communities that currently lack invasive plants.

Table 3.4 indicates that anticipated disturbance to Greater Sage-grouse habitat, under the assumption that disturbance is spatially equal across all nominated parcels. Direct and indirect impacts of oil and gas developments are analyzed in the Nevada and Northeastern California Greater Sage-Grouse Final Environmental Impact Statement (BLM & USDA Forest Service, 2019). These impacts include habitat loss, increased predation, increased invasive species, and noise disturbance. Required Design Features (RDFs) and timing stipulations would also be applied when an APD is received. A list of the potential RDFs that could be applied to an APD are included in Appendix G. The proponent would also be required to coordinate with the Sagebrush Ecosystem Technical Team (SETT) to determine if the Conservation Credit System (CCS) needs to be applied. The CCS is compensatory mitigation for direct and indirect anthropogenic disturbances on both federal and state lands.

Table 3.4 Anticipated Acres of Direct Disturbance in Greater Sage-grouse Habitat

Habitat	RMP Open to Leasing (Acres)	RFFD Disturbance Acres		Habitat within Nominated Parcels (acres)	Anticipated Disturbed Acres	
		Short Term	Long Term		Short Term	Long Term
PHMA*	10,035,200	0%	0%	11,430	0	0
GHMA		8,406 (0.08%)	1,401 (0.01%)	3,500	3	<1
OHMA				800	<1	<1
Nesting				11,600	9	1
Brood rearing				10,630	9	1
Winter				14,200	11	1

*Open to fluid mineral leasing subject to no surface occupancy stipulation with possible exceptions, modification, or waivers.

No Action Alternative

Under the No Action Alternative, the lease sale would not occur, and no impacts to special status plant or animal species would occur.

3.3.7. Visual Resource Management

Affected Environment

The proposed parcels nominated for lease fall within Visual Resource Management (VRM) Classes designated in the Ely RMP (BLM 2008). BLM administered lands are placed into four visual resource inventory classes: VRM Classes I, II, III, and IV. Class I and II are the most sensitive, Class III represents a moderate sensitivity and Class IV is of the least sensitivity VRM classes serve as a management tool that

provides an objective for managing visual resources. Table 3.4 below includes the VRM Classification Objectives within the project area.

Table 3.5 VRM Classification Objectives

VRM Class	Visual Resource Objective	Change Allowed (relative level)	Relationship to the Casual Observer
Class III	Partially retain the existing character of landscape. The level of change to the characteristic landscape should be moderate.	Moderate	Activities may attract attention, but should not dominate the view.
Class IV	Provide for management activities, which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.	High	Activities may attract attention, may dominate the view.

The Ely District is typical Basin and Range topography with north to south trending mountain ranges with valleys in between. Vegetation is predominantly grasses and shrubs in the valleys leading to pinion and juniper woodlands on the ranges. Vegetation colors are predominantly tan, light sage green to darker greens. Exposed rock is limestone, quartzite, and some volcanic with colors of grey, tan, brown. Soils have similar lighter colors of grey, tan and brown. Typical visible man made features in the areas could include, roads, vegetation treatments, mining activity, fences, power lines, and range improvements.

On the Ely District, the VRM classes are primarily situated as follows. VRM Class I- All Wilderness, Wilderness Study Areas and Blue Mass Scenic Area. VRM Class II- majority of the ranges, the Pony Express corridor and other visually important areas. VRM Class III- most valleys. VRM Class IV- mostly large wide valley bottoms and an energy corridor.

Group 1 parcels are located within VRM Class III and IV. These parcels are located in the remote northwestern edge of the Ely District within Long Valley on the southeastern slope of the Alligator Ridge.

Group 2 parcels are located within VRM Class III and IV. These parcels are located in the central part of the District. The parcels are situated on both side of Highway 50 in Jakes Valley.

Group 3 parcels are located within VRM Class IV. These parcels are located in the remote northwestern edge of the Ely District in Newark Valley, just west of USFS Mt. Hamilton.

Environmental Effects

The actual sale of the lease parcels would not impact visual resources, though the development of the leased parcels may impact visual resources. When an APD is submitted, a site-specific visual contrast rating would be conducted. The contrast rating would identify what types of mitigation are needed to minimize any visual contrast. Those recommended mitigation measures would be incorporated into the APD as a means to meet the VRM class objective.

Proposed Action

Group 1 and 2 parcels are within VRM Class III and IV should meet the class objectives by incorporating design features or requiring mitigation measures.

Group 3 parcels are within VRM IV and would meet the objective as proposed, however the BLM would still require design features and mitigation to be incorporated.

No Action Alternative

Under No Action Alternative the lease sale would not occur, therefore no additional impacts to visual resources would occur.

3.3.8. Livestock Grazing

Affected Environment

For the purpose of this EA the Affected Environment for the proposed oil and gas leasing area is the same as that described in Section 3.5 of the RMP/FEIS.

The Ely District BLM authorizes livestock grazing use on all allotments which overlap the proposed oil and gas leasing area. The list of affected allotments and the parcel group they fall in are listed below in Table 3.5.

Table 3.6 Grazing Allotments in the Lease Sale Area

Grazing Allotment	Allotment Number	Allotment Pasture	Parcel Group
Warm Springs	00606	Long Valley	1
Moorman Ranch	00802	Townsend Seeding	2
		East Jake's Seeding	
		West Jake's	
Tom Plain	00803	n/a	2
South Pancake	00615	West	3
		East	
Newark[1]	00608	18 Mile House	3

[1]Allotment includes <10% area of Parcel 2014

Term permits authorize grazing use based on perennial vegetation. Authorized grazing use includes both cattle and sheep. Allotment grazing periods of use vary and include both seasonal and yearlong. Seasons include fall/winter/spring period and spring/summer/fall period. Grazing systems may include rest-rotation, deferred rotation, and deferred rest rotation. Allotments that are grazed both yearlong and seasonally include herding of cattle and sheep between public land allotments, base property, other leased or private pasture and U.S. Forest Service-administered lands. Some allotments are grazed in common by two or more livestock permittees. Livestock are either mixed together in the same use area or graze in separate use areas of the allotment. Authorized grazing use is in accordance with established use periods or seasons of use for the allotment.

Environmental Effects

Proposed Action

There would be no direct effects from issuing new oil and gas leases because leasing does not directly authorize oil and gas exploration and development activities. Should exploration or development be proposed within leased parcels, additional, site specific NEPA analysis would be completed to assess the potential impacts to livestock grazing within the project area when an APD is submitted.

Under the proposed action for the lease sale, livestock grazing would continue; however, should development occur on the lease, loss of forage and possible reductions of AUMs could occur in the allotments due to disturbance and activity. Range improvements and livestock movement patterns could be hindered by new roads and oil well pads. Increased traffic may lead to an increase in vehicle livestock collisions, and increasing mortality rates. Potential impacts to specific range improvements would be analyzed with site-specific NEPA review at the APD stage. Mitigation measures would be included with the lease protecting range improvements.

No Action Alternative

Under the No Action Alternative, the lease sale would not occur and no impacts to livestock grazing resources would occur.

3.3.9. Geology and Mineral Extraction

Ely District Geology

The Ely District falls within the basin and range province where much of the topography includes island like mountain ranges and intermontane basins filled by alluvium shed off the surrounding ranges. Most of the mountain ranges are oriented north-south. Several of the basins are interconnected and allow surface drainage to flow between them. However, some basins are sealed off and the drainage within the basin does not flow outside the basin, at least at the surface. Tschanz and Pampeyan (1970) described the lithology and stratigraphy in the Ely District.

Historic Geology and Stratigraphy of the Ely District (summarized from Tschanz and Pampeyan 1970): Paleozoic sediments were deposited in a shallow sea environment (miogeosyncline) in the area that is now White Pine County, Nevada. Thick sequences of Cambrian and Devonian rocks accumulated, including the carbonaceous Pilot Shale in upper Devonian time. The Mississippian assemblage included the Chainman Shale, black shale that typically contains disk-like concretions with disseminated pyrite. Depth of the sediments decreased to the southeast where they lapped onto the relatively elevated Mormon Mountain arch which was underlain by Proterozoic-aged (Precambrian) rocks. The Mormon Mountain arch was probably below sea level throughout much of Paleozoic time. At least 50,000 feet of sediments were deposited in the deeper portions of the basin northwest of the arch.

Sedimentation continued into late Triassic time when deposition became more characteristic of a developing continental environment. In late Cretaceous time, events associated with the Laramide orogeny produced thrusting that dislocated older sedimentary rocks for tens of miles to the east atop younger sedimentary units. Large scale strike-slip faults (tear faults) within the thrust plates further dislocated large blocks.

In Tertiary time, large volumes of volcanic materials were erupted. The volcanics were largely pyroclastic; welded tuff, lava and tuffaceous sediments were deposited over large areas, perhaps thousands of square miles. Subsequent to the eruption of most of the volcanics and the deposition of associated intraformational sedimentary deposits, normal faulting initiated uplift of the various north-south ranges and produced the Basin and Range topography.

Erosional forces have deposited thick accumulations of gravel and sand in the valleys. During the Pleistocene, most of the valleys in the White Pine County area held abundant water in lakes and rivers. Finer sediments from reworked deposits were deposited in the lake beds. Rivers removed accumulated sediments from the valleys and transported them to the south. The end of the Pleistocene initiated the climates and conditions of the present Basin and Range geographic province.

Structural Geology in the Ely District: Regional structures have affected large-scale horizontal displacement on the order of 30 miles; the structures include Laramide-age thrust faults and northeast-trending strike-slip (tear) faults. Laramide thrust faults are documented in the Tule Springs Hills, Meadow Valley Mountains, Sheep Range, Pahranagat Range, and the Spotted Range. Strike-slip faulting is exemplified by three faults south of Alamo in the Pahranagat Valley (Arrowhead Mine, Buckhorn and Maynard faults). The faults represent a shear zone with significant right-lateral displacement known as the Pahranagat shear system; it has most recently been reactivated as a left lateral system that demonstrates less cumulative displacement than the earlier system. The strike-slip system is interpreted as the propagation of a basement rift similar to the San Andreas or Las Vegas shear zones (Tschanz and Pampeyan 1970).

Tertiary normal faulting is largely responsible for the formation of the north-south mountain ranges and intervening valleys that characterize the geography of the Eastern Nevada landscape. Basin and range faulting has, however, resulted in smaller overall displacements than the tear faults and thrust faults mentioned above (Tschanz and Pampeyan, 1970).

More recently, Stewart (1980) and Rowley and Dixon (2001) have placed the regional geology of the Basin and Range into the framework of plate tectonics. Generally, the region has been subject to Mesozoic to mid-Cenozoic thrusting associated with the eastward subduction of the Pacific plate under the western United States (compression). Basin and range, north-trending, extensional faulting began about 20 million years ago.

Locatable Minerals

Locatable minerals are mostly metallic minerals, semi-precious and precious gemstones, and rare earth elements. Metallic minerals include precious metals such as gold, silver, and base metals (zinc, molybdenum, nickel, cinnabar, lead, tin, and copper. Some nonmetallic minerals can also be considered locatable such as bentonite, borax, fluorspar, and gypsum. Uranium, a rare earth element is often considered a locatable mineral. These minerals are explored and developed pursuant to the Mining Law of 1872, as amended and the Federal Land Policy and Management Act of 1976, and often occur on mining claims.

Mineral Materials (Salable Minerals)

Mineral materials (salable minerals) are available through a series of competitive and non-competitive sales and by free use permit to governmental agencies and non-profit organizations pursuant to the Materials Act of July 31, 1947, as amended, the Surface resources Act of 1955, and the Federal Land Policy and Management Act of 1976. Salable minerals include common varieties of sand, gravel, stone, pumice, pumicite, cinders, and clay. These resources are abundant throughout the Ely District and are often concentrated in the basins.

Leasable Minerals

Leasable minerals include coal, phosphate, oil, oil shale, gas, and sodium resources on the public domain as designated by the Mineral Leasing Act of 1920 as Amended. The Mineral Leasing Act was amended to include minerals associated with lands acquired by the United States and by the Geothermal Steam Act of 1970 to include geothermal resources. Leasable minerals under federal ownership are available for development through the BLM's leasing program. There are minimal to no known economic deposits of coal, phosphate or sodium in the Ely District. Geothermal resources occur throughout the Ely District as well. However, no leases or production have been authorized on the nominated lands. The regions of the Ely District vary from low to high potential for oil, oil shale, and gas deposits. Further details on oil and gas geology and potential can be found in Chapter 1.

Environmental Effects

This section discusses the potential impacts from leasing nominated parcels according to the two alternatives. Information on mineral claims, leases, exploration, and development was obtained using reports pulled from BLM's Oracle Legacy Rehost software, "LR2000 database," on April 5, 2019.

Proposed Action

Locatable Minerals

Several lode and placer mining claims occur in nominated parcels. Additional research involving the Nevada State Office and county courthouses to determine if the claims truly overlap the parcels is not necessary for this level of analysis. Further research would be conducted during site-specific NEPA analysis when an APD is submitted, given the parcels would be leased.

Mining operations have been authorized in Township 25N Range 58E, which overlap nominated parcels and are managed under the Multiple Mineral Development Act (30 U.S.C. § 521 et seq.). All parcels T25N R58E are located within the authorized Plans of Operation for Kinross Gold-Bald Mountain Mine. There are three active mining Plans of Operation authorized for: 1) North Area of Operations, 2) South Area of Operations, and 3) Exploration. The active mining for these Plans of Operations include pits, leach pads, waste rock storage facilities, haul roads, exploration roads, exploration drill pads, and other facilities/infrastructure at the Bald Mountain Mine.

Oil and Gas leasing, exploration, and development could interfere with the exploration and extraction of locatable minerals on these parcels. Potential interference may be mitigated at the time of development by coordination and agreement between the operators. Additionally, oil and gas exploration and development in Nevada typically involves reclamation within ten years; therefore, it may only temporarily effect locatable mineral operations, if simultaneously authorized.

Mineral Materials

No nominated lands contain mineral material sites. Issuing oil and gas leases on these lands would allow for development of potential oil, oil shale, and gas deposits, and should have minimal to no effect on potential future development of other mineral materials (e.g. sand, gravel, dimension stone, etc.).

Leasable Minerals

No nominated lands contain existing leases. Issuing oil and gas leases on these lands would allow for development of potential oil, oil shale, and gas deposits, and should have minimal to no effect on potential future development of other leasable minerals (e.g. geothermal, phosphate, sodium, etc.).

No Action Alternative

The No Action Alternative would not have an effect on locatable minerals, mineral materials, or leasable minerals except that it would reduce the opportunity for exploration and discovery of potential oil and gas deposits that are needed to supply local, regional, and national needs.

3.3.10. Wastes, Hazardous and Solid

Affected Environment

The nominated lease parcels are dispersed throughout rural areas and are not adjacent to any school or population centers. However, the Moormon Ranch is located within parcel group 2 and there are multiple allotments within all parcel groups.

Environmental Effects

Proposed Action

Oil and gas activities including exploration drilling, extraction, production facilities, pipeline transport, and tanker loading, unloading and transport, have the potential to affect the environment through production of waste fluids, emissions and site impacts resulting from field development and related infrastructure. Oil spills, produced waters, drill fluids/cuttings, and hazardous materials could be encountered at a facility or drill pad. Under any alternative, all appropriate statutes, regulations and policies (see Section 1.4) and Gold Book standards, guidelines and BMPs would be applied.

The RFFD scenario (Section 2.4) predicts that approximately 200 exploration wells would be drilled in the District in the next 10 years, of which 40 would continue into development and production phases.

Examples of indirect (future) environmental impacts from hazardous materials, hazardous waste, and solid waste which might be encountered during each phase are provided below. However, most of these incidental impacts, if not all, can be avoided or lessened through proper inspection and maintenance.

Exploration: Impacts could include drilling fluid or hydrocarbon spills, leakage from improperly constructed reserve pits or wastewater collection systems, improperly handled brine backflow water from drilling that may or may not have used HF technology, and accumulations of solid waste, which could impact water quality or contaminate soils. Hydrocarbon spills could consist of hydraulic fluid, gasoline, diesel, oil, or grease from vehicles, generators, and exploration drill rigs. Backflow water from exploration drilling can be extremely saline; improper disposal could raise the pH of existing surface waters to unacceptable levels. Accumulations of nonhazardous solid waste could include trash, drill cuttings or mud, wastewater, bentonite and cement generated during drilling operations.

Development: Impacts could be the same as in the exploration phase; however, the quantities of hazardous materials, hazardous waste, or solid waste used and generated could be greater. Accidental releases from reserve pits or waste water collection systems could include hazardous water treatment chemicals such as chlorine. Also, stormwater runoff could contain elevated quantities of heavy metals and volatile organic compounds. When fracked water comes back to the surface as backflow, it can contain high levels of salts, introduced chemical additives, and various chemicals and compounds that occur naturally within the earth.

Backflow spills have been known to kill off all vegetation and render the soil unusable. Nonhazardous solid waste such as drill cuttings or mud could be generated at this stage.

***Production**:* Routine plant operations could involve leaks or spills of substances such as hydraulic fluid, gasoline, diesel, oil, paint, antifreeze, cleaning solvents, transformer insulating fluid, and grease. These discharges could result in impacts to water, soil, air, and wildlife. Stormwater runoff containing heavy metals and VOCs could be problematic. Nonhazardous solid waste could also be generated.

Final Abandonment: The operator would identify, remove, and properly dispose all hazardous materials, hazardous waste, and solid waste. Spills could occur during removal.

When the RFD scenario is considered, impacts would generally be negligible because the substances involved would be properly handled, stored, and disposed of in accordance with applicable federal, state and local regulations. Proper management of these substances would ensure that no soil, ground water, or surface water contamination would occur with any adverse effect on wildlife, worker health and safety, or surrounding communities. Additional project- and site-specific environmental analysis of any future exploration, development and/or production would allow inclusion of updated mitigation measures, BMPs, and COAs; and performance standards would be defined at that time.

Impacts of any hazardous waste spills in areas with water resources would be potentially substantial and difficult to mitigate. The CSU Water Resources stipulation would require avoiding impacts within 500 feet of surface waters and riparian areas; impacts within 100 feet of ephemeral streams; and impacts to floodplains and playas. Application of this stipulation would not only prevent surface disturbance within the defined areas but would also prevent indirect impacts including accidental contamination.

No Action Alternative

Under the No Action Alternative, the lease sale would not occur and there would be no concerns or issues with solid of hazardous wastes.

Chapter 4. Cumulative Impacts

4.1. Resources

As required under the National Environmental Policy Act (NEPA) and the regulations implementing NEPA, this section analyzes potential cumulative impacts from past, present, and reasonably foreseeable future actions combined with the Proposed Action within the area analyzed for impacts in Chapter 3 specific to the resources for which cumulative impacts may be anticipated.

A cumulative impact is defined as "the impact which results from the incremental impact of the action, decision, or project when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 Code of Federal Regulations (CFR) 1508.7).

The geographic scope of a cumulative effect is defined with the Cumulative Effects Study Area (CESA). CESAs are defined for each resource evaluated. Two or more resources may have the same CESA.

For the purpose of this EA, only indirect impacts are discussed in this section. Direct incremental cumulative impacts from a potentially proposed oil well would be analyzed during the APD review process. There are no cumulative impacts from leasing. The following is a discussion of cumulative impacts resulting from potential future development. There would be no cumulative impacts to Cultural Resources or Livestock Grazing as a result of implementing the Proposed Action.

4.2. Past, Present, and Reasonably Foreseeable Future Actions

Past Actions

The Ely District is rich in natural resources and the cumulative effects study area has been used for a wide array of activities over the years. Mining, grazing, recreation, realty actions, and oil exploration have been conducted throughout the Ely District and more than likely, would continue for many more years. While more than 200 wells have been drilled in the Ely District, only two are in production.

Present Actions

Refer to the affected environment discussions in Chapter 3 for presently authorized activities affecting the nominated parcels.

Reasonably Foreseeable Future Actions

Table 4.1 shows a list of Reasonably Foreseeable Future Actions (RFFA) that have been analyzed for environmental impacts within the project area. Mining, grazing, recreation, realty actions, fuels treatments and oil exploration are being conducted throughout the District. For purposes of this cumulative impacts analysis the project area includes White Pine County and the northwestern corner of Nye County. The approximate total ground disturbance of RFFAs is 14,791 acres.

Table 4.1 Reasonably Foreseeable Future Actions

Project Name	**Location (County)**	**Type of Action**	**Acres of Disturbance**
White Pine County	White Pine	Land and Realty	432

Project Name	Location (County)	Type of Action	Acres of Disturbance
Conservation, Recreation, and Development Act (WPCCRDA) Round #2 Sales/Disposal			
Western Oil: Scott Federal 25-1	White Pine	Mining	3
Major Oil: Eblana #1A	White Pine	Mining	6
Major Oil: Eblana #6	White Pine	Mining	6
SAM Oil: #1-9	White Pine	Mining	6
Gold Rock Mine Project	White Pine	Mining	3,946
Pan Mine Project	White Pine	Mining	3,301
Bald Mountain Mine North and South Operations Area Projects	White Pine	Mining	7,097
			Total 14,791

4.3. Cumulative Impacts

4.3.1. Air Quality and Climate Change

Proposed Action

Cumulative impacts to air quality would occur only as a result of APD approval and subsequent development, and not from the proposed action of offering the lease parcels. Impacts to air quality within the CESAs for air quality from past and present actions have included particulate ($PM_{2.5}$ and PM_{10}) and combustion emissions from agriculture, road construction and maintenance, off-highway vehicle (OHV) use and recreation, exploration, mining and processing activities, aggregate operations, public land management activities, and wildland fire. All activities within the CESAs with more than five acres (20 acres for minerals projects) of surface disturbance would operate under an air quality permit from the State of Nevada Bureau of Air Pollution Control (BAPC). Impacts to air resources from past and present actions in the CESAs are considered to be moderate lasting only as long as the activities persist.

Impacts to air quality from Reasonably Foreseeable Future Actions (RFFAs) could result from the generation of dust and combustion emissions from OHV use and recreational traffic on unpaved roads, livestock grazing, agricultural use, road construction and maintenance, exploration, aggregate operations, public land management activities, and fugitive emissions from wildland fire. Dust from public traffic on unpaved roads would likely create a low impact to air quality.

The cumulative impact on air quality from the incremental impact of the proposed action when added to the past actions, present actions, and RFFAs would be fugitive, point source, and related mobile combustion emissions, which would remain low. Any air quality regulations implemented by BAPC and the BLM help to maintain the attainment status of the current regional air quality.

No Action Alternative

The No Action Alternative would have no cumulative impacts to air quality in the area. Activities on currently leased parcels adjacent to the proposed parcels would remain on-going as permitted on surrounding federal, state, and private lands.

4.3.2. Cultural Resources

Proposed Action

Cumulative impacts to cultural resources could occur in the event that an APD is approved and development proceeds. The Proposed Action would have no direct or indirect impacts to cultural resources, and therefore no cumulative impacts.

No Action Alternative

The No Action Alternative would have no cumulative impacts to cultural resources. Activities on currently leased parcels adjacent to the proposed parcels would remain on-going as permitted on surrounding federal, state, and private lands.

4.3.3. Floodplains

Proposed Action

Cumulative impacts to floodplains would occur only as a result of APD approval and subsequent development, and not from the proposed action of offering the lease parcels. Impacts to floodplains within the water resources CESAs have resulted from past and present actions such as grazing, road construction and maintenance, OHV use and recreation, mining and processing activities, aggregate operations, public land management activities, and wildland fire. Reclamation of areas disturbed from past and present actions and natural revegetation have helped to minimize impacts to floodplains.

Impacts to floodplains from RFFAs would be similar to those described above for past and present actions. Though mining and exploration activities are not likely to be permitted within flood-prone areas, disturbances from permitted mining and exploration activities would be minimized through implementation of environmental protection measures.

The cumulative impact to floodplains from the incremental impact from parcel development following an APD approval, when added to the past actions, present actions, and RFFAs may add effects such as soil disturbance, compaction, and increased erosion. However, stipulations and conditions of approval, coupled with compliance with state and federally-imposed regulations would help to minimize the level of these incremental impacts.

No Action Alternative

The No Action Alternative would have no cumulative impacts to floodplains in the area. Activities on currently leased parcels adjacent to the proposed parcels would remain on-going as permitted on surrounding federal, state, and private lands.

4.3.4. Water Quality, Surface/Ground

Proposed Action

Cumulative impacts to water quality and surface and groundwater resources would occur only as a result of APD approval and subsequent development, and not from the proposed action of offering the lease parcels. Impacts to water quality, surface water resources, and groundwater resources within the CESAs

for these resources have resulted from past and present actions such as grazing, road construction and maintenance, OHV use and recreation, mining and processing activities, aggregate operations, public land management activities, and wildland fire. Reclamation of areas disturbed from past and present actions and natural revegetation have minimized impacts to water quality and surface water and ground water resources.

Impacts to water quality and surface water and ground water resources from RFFAs would be similar to those described above for past and present actions. Disturbances from permitted mining and exploration activities would be minimized through implementation of environmental protection measures.

The cumulative impact to water quality and surface water and ground water resources from the incremental impact from parcel development following an APD approval, when added to the past actions, present actions, and RFFAs may add effects such as fluid fluxes into groundwater and sediment influx to surface water. However, stipulations and conditions of approval, coupled with compliance with state and federally-imposed regulations would help to minimize the level of these incremental impacts.

No Action Alternative

The No Action Alternative would have no impacts on water quality and surface and groundwater in the area. Activities on currently leased parcels adjacent to the proposed parcels would remain on-going as permitted on surrounding federal, state, and private lands.

4.3.5. Fish and Wildlife, Special Status Species

Proposed Action

The CESA for fish and wildlife and special status species is bounded by Highway 50 to the north and the White Pine County line to the south. It encompasses portions of big game hunt units 104, 108, 121, 131, 132, 144, and 22, in addition to portions of the Butte/Buck/White Pine and Ruby Valley Greater sage-grouse Population Management Units. Cumulative impacts to fish and wildlife, including special status species, would occur only as a result of APD approval and subsequent development, and not from the proposed action of offering the lease parcels. Impacts to wildlife within the CESAs from past and present actions include agriculture, road construction and maintenance, off-highway vehicle (OHV) use and recreation, exploration, mining and processing activities, aggregate operations, public land management activities, livestock grazing, wild horses and wildland fire.

Impacts to wildlife from RFFAs could result from recreation, livestock grazing, agricultural use, road construction and maintenance, exploration, aggregate operations, public land management activities, wild horses, and wildland fire.

The cumulative impact on wildlife from the incremental impact of the proposed action when added to the past actions, present actions, and RFFAs would be the additional loss of habitat, habitat fragmentation, displacement, and loss of some individuals. Stipulations applied to the lease parcels would minimize impacts to wildlife and crucial habitat.

No Action Alternative

The No Action Alternative would have no additional impact to fish and wildlife. Activities on currently leased parcels adjacent to the proposed parcels would remain on-going as permitted on surrounding federal, state, and private lands.

4.3.6. Visual Resource Management

Proposed Action

The actual sale of these parcels would have no cumulative impact on VRM. However if fluid minerals are discovered and these parcels were to go into production even with design features and mitigation incorporated there could potentially be negative cumulative impacts to VRM. Large-scale production within the area would be seen and would attract attention and could require an RMP amendment with a VRM Class adjustment to Class III or IV.

No Action Alternative

The No Action Alternative would have no cumulative impacts to VRM. Activities on currently leased parcels adjacent to the proposed parcels would remain on-going as permitted on surrounding federal, state, and private lands.

4.3.7. Livestock Grazing

Proposed Action

Cumulative impacts to livestock grazing could occur in the event that an APD is approved and development proceeds. The Proposed Action would have no direct or indirect impacts to livestock grazing, and therefore no cumulative impacts.

No Action Alternative

The No Action Alternative would have no cumulative impacts to livestock grazing. Activities on currently leased parcels adjacent to the proposed parcels would remain on-going as permitted on surrounding federal, state, and private lands.

4.3.8. Geology and Mineral Extraction

Proposed Action

Exploration and development for locatable minerals, mineral materials, and leasable minerals have occurred near the nominated lands. The authorized mining projects listed above are in Township 22N Range 58E and Township 21N Range 58E. The RFFD assumes permitting an average of 22 wells for 81 acres of short-term and 33 acres of long-term disturbance each year since 2008. Therefore, 198 wells and 729 acres of short-term and 297 acres of long-term disturbance is assumed to have occurred since 2008. The Ely district has only approved 14 APDs since 2008 averaging a single well per pad, however, not every APD approved is actually drilled and only 10 wells have resulted. Table 4.1 shows three APDs assumed as future actions totaling 18 acres of predicted disturbance. If 22 wells are permitted as a result of offering these parcels for

sale, the total number of wells permitted in the Ely District would be 39 of the assumed potential 198. Three APDs were recently of undergoing approval within the project area.

No Action Alternative

The No Action Alternative would have no cumulative impacts to geology and mineral extraction in the area. Activities on currently leased parcels adjacent to the proposed parcels would remain on-going as permitted on surrounding federal, state, and private lands.

4.3.9. Wastes, Hazardous and Solid

Proposed Action

Other major activities potentially generating hazardous and solid waste include mining and existing oil and gas exploration, development and production projects. Given the small acreage of oil and gas activity disturbance identified in the RFFD (745-5600 acres), as well as any mitigation developed during additional site-specific analysis for oil and gas exploration and development, the contribution to cumulative impacts would be negligible. Also, federal and state governments specifically regulate each project to ensure that there are no releases of hazardous materials, hazardous waste or solid waste into the environment. As discussed in Section 3.3.10, a slight risk of accidental spillage exists, and the consequences of any spill would be greater in wetlands, springs/seeps, riparian areas, floodplains and seasonally flooded playas. The CSU Water Resources stipulation would generally prevent direct or indirect contamination of these areas.

No Action Alternative

Under the No Action Alternative additional hazardous and solid wastes would not be produced and there would be no cumulative effects.

Chapter 5. Consultation and Coordination

5.1. Individuals, Organizations, and Tribes Consulted

5.1.1. Individuals and Organizations

The BLM consulted with the following individuals and Organizations prior to the Public Comment Period:

- Nevada Department of Wildlife
- United States Fish and Wildlife Service

5.1.2. Tribes

The BLM Ely District Office, Bristlecone Field Office, reached out to federally recognized tribes, in compliance with Executive Order 13175 Consultation and Coordination with Indian Tribal Governments, by sending consultation letters seeking input on April 8, 2018. The following Tribes were sent consultation letters:

- Cedar Band of Paiute Indians
- Confederated Tribes of the Goshute Reservation
- Duckwater Shoshone Tribe
- Ely Shoshone Tribe
- Indian Peaks Band of Paiute Indians
- Kaibab Band of Paiute Indians
- Kanosh Band of Paiute Indians
- Koosharem Band of Paiute Indians
- Las Vegas Paiute Tribe
- Moapa Band of Paiute Indians
- Paiute Indian Tribe of Utah
- Shivwits Band of Paiute Indians
- Shoshone-Paiute Tribes of the Duck Valley Indian Reservation
- Te-Moak Tribe of Western Shoshone
- Te-Moak Tribe of Western Shoshone, Battle Mountain Band
- Te-Moak Tribe of Western Shoshone, South Fork Band
- Te-Moak Tribe of Western Shoshone, Elko Band
- Te-Moak Tribe of Western Shoshone, Wells Band
- Yomba Shoshone Tribe

Chapter 6. List of Preparers

Table 6.1 List of BLM Preparers

Name	Title	Responsible for the Following Resources
Andrew Gault	Hydrologist	Air Quality, Floodplains, Water Quality, Surface and Water Resources, Wetlands and Riparian Zones
Nancy Herms	Wildlife Specialist	Migratory Birds, T&E Species, Special Status Species, Fish and Wildlife
Stacy Holt	Environmental Protection Specialist (Minerals)	Mineral Resources
John Miller	Recreation Specialist	Lands With Wilderness Characteristics, Visual Resource Management
Alicia Hankins	Land Law Examiner	Lands And Realty
Maria Ryan	Natural Resource Specialist	Livestock Grazing and Vegetation
Elizabeth Seymour	Native American Tribal Coordinator	Native American Religious Concerns, Tribal Coordination
Tiera Arbogast	Planning and Environmental Coordinator	Project Lead

Chapter 7. References

43 CFR, 2009. Title 43 Code of Federal Regulations, Part 1000 to End.

BLM 2007. Ely Proposed Resource Management Plan/Final Environmental Impact Statement. November, 2007. USDI-BLM. Ely District Office.

BLM 2008a. Ely District Record of Decision and Approved Resource Management Plan. United States Department of the Interior, Bureau of Land Management, Ely District: Ely, Nevada. August 2008.

BLM 2017. United States Department of the Interior Bureau of Land Management Preliminary Environmental Assessment. December 2017 Competitive Oil and Gas Lease Sale. DOI-BLM-NV-L030-2017-0021-EA. Available online: https://eplanning.blm.gov/epl-front-office/projects/nepa/85574/137283/167637/2017O&G_EA_FINAL-20170926_(2)_508.pdf

BLM and USDA, Forest Service, 2006. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, The Gold Book: Fourth Edition.

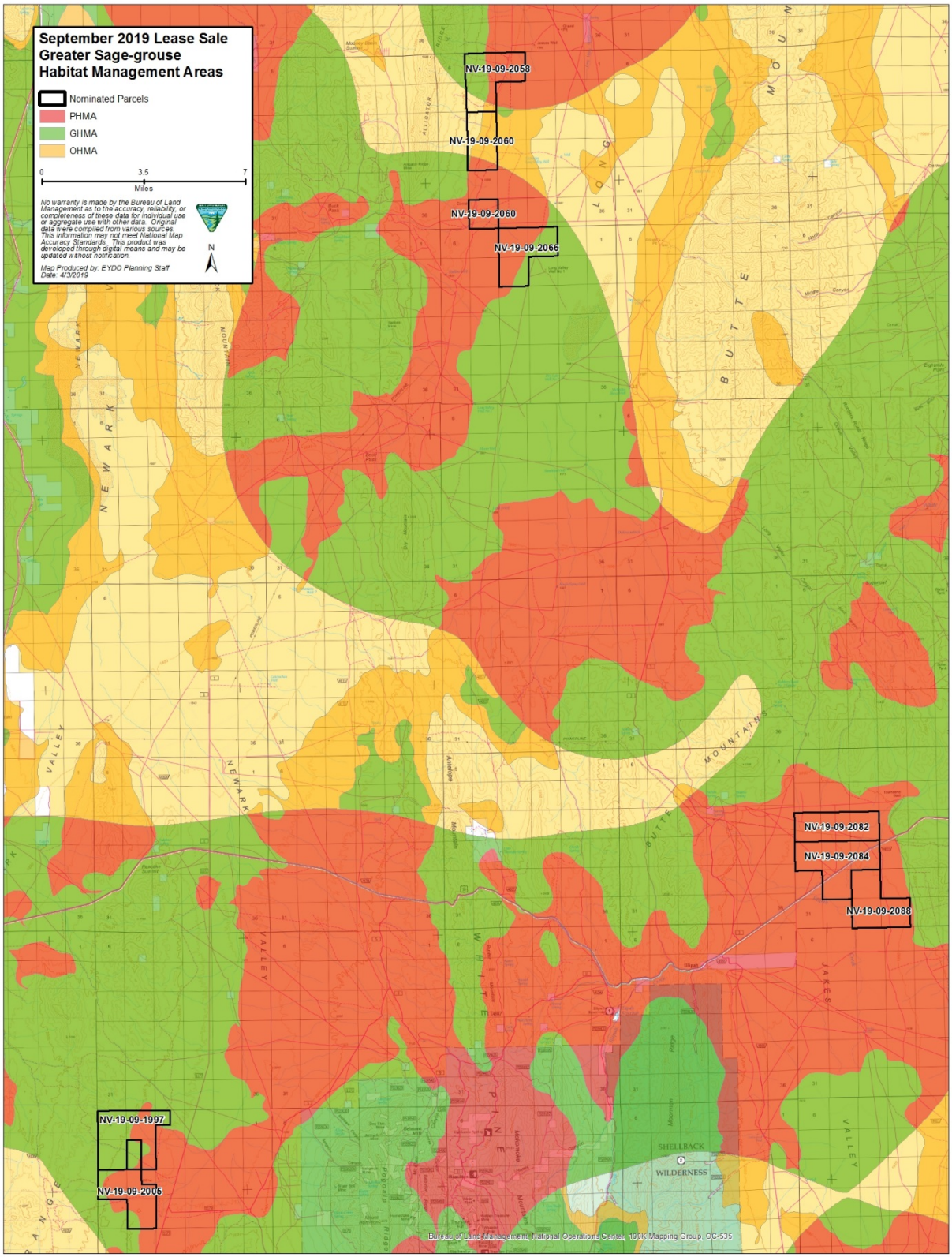
BLM 2019. Nevada and Northeastern California Greater Sage-Grouse Record of Decision and Approved Resource Management Plan Amendment. March 2019.

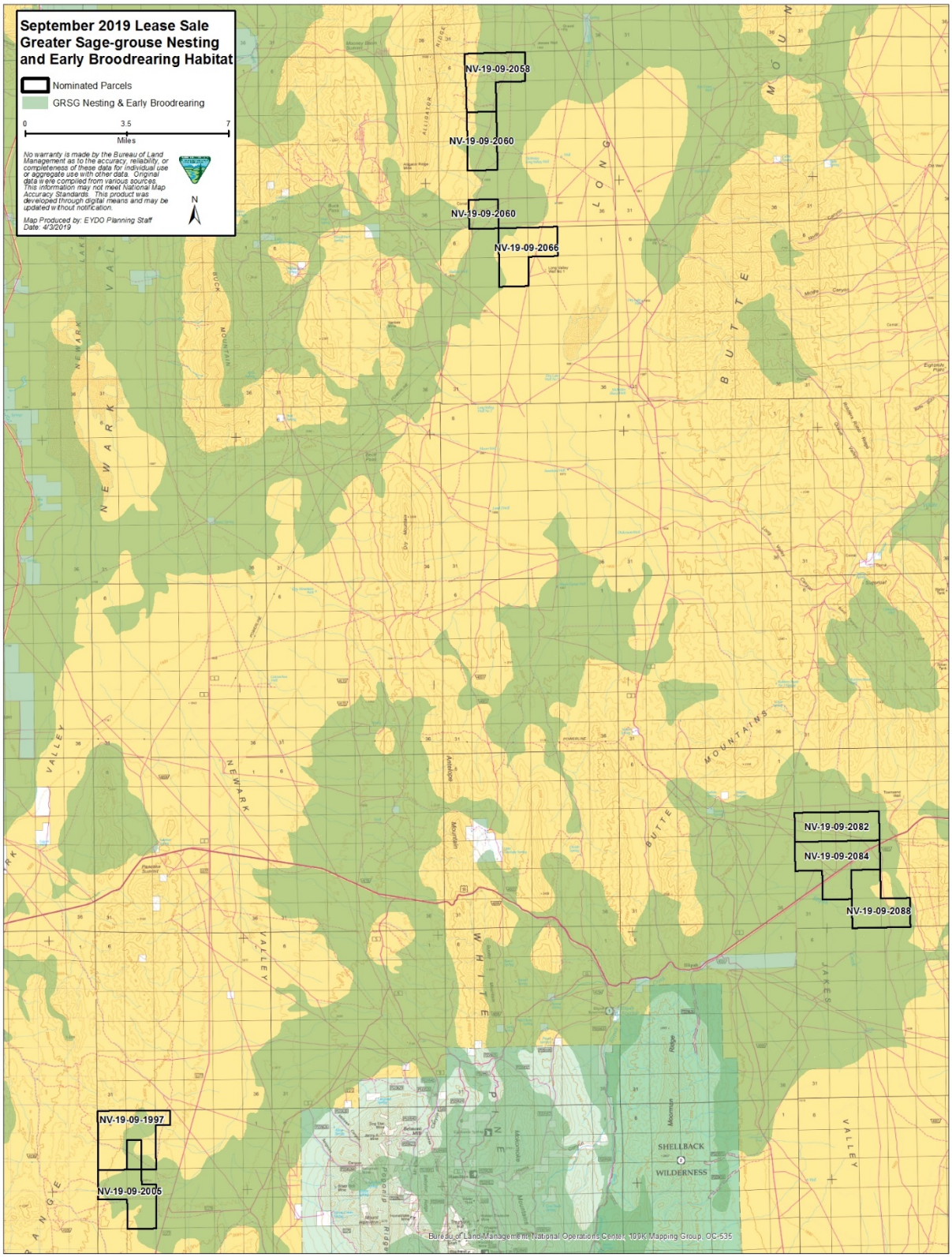
Heilweil, V.M., and Brooks, L.E., Editors. 2011. Conceptual model of the Great Basin carbonate and alluvial aquifer system. United States Geological Survey Scientific Investigations Report 2010-5193. 191 pp.

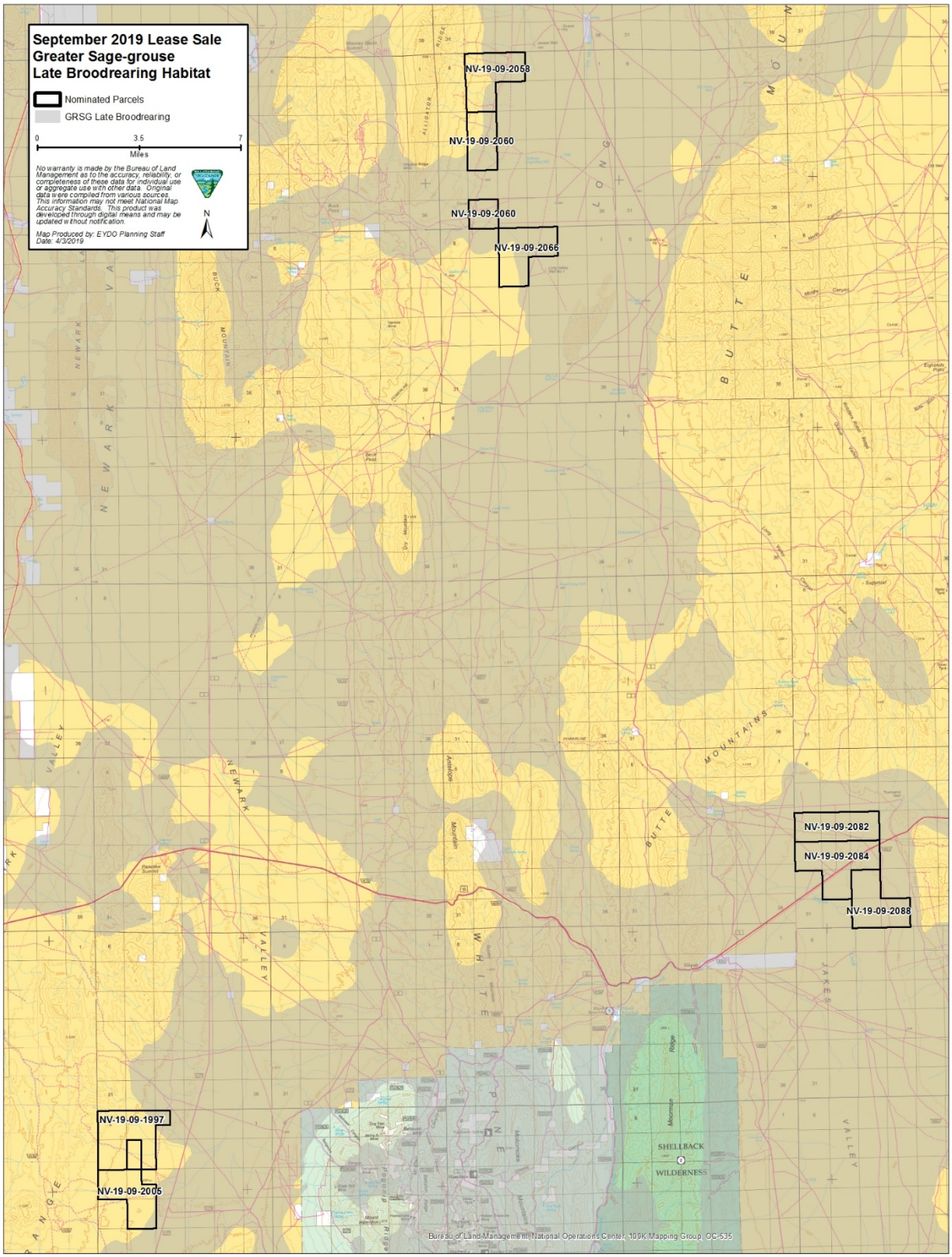
NDWR, 2017. State of Nevada Division of Water Resources. Hydrographic Abstracts. Available online: http://water.nv.gov/UndergroundActive.aspx

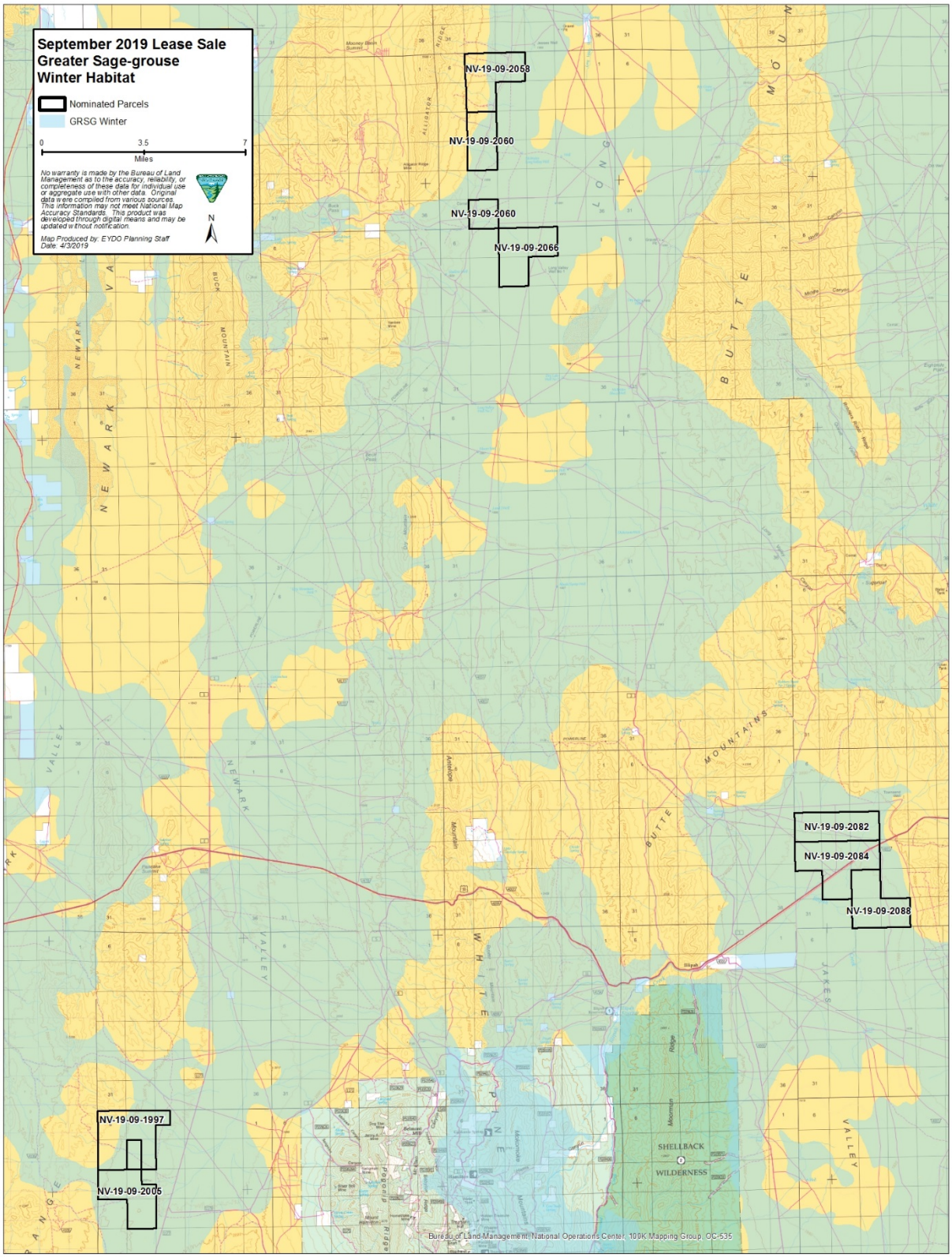
Welch, A. H., D. J. Bright, and L. A. Knochenmus, Editors. 2007. Water Resources of the Basin and Range Carbonate-Rock Aquifer System, White Pine County, Nevada, and the Adjacent Areas in Nevada and Utah: U.S. Geological Survey Scientific Investigations Report 2007-5261. 96 pp.

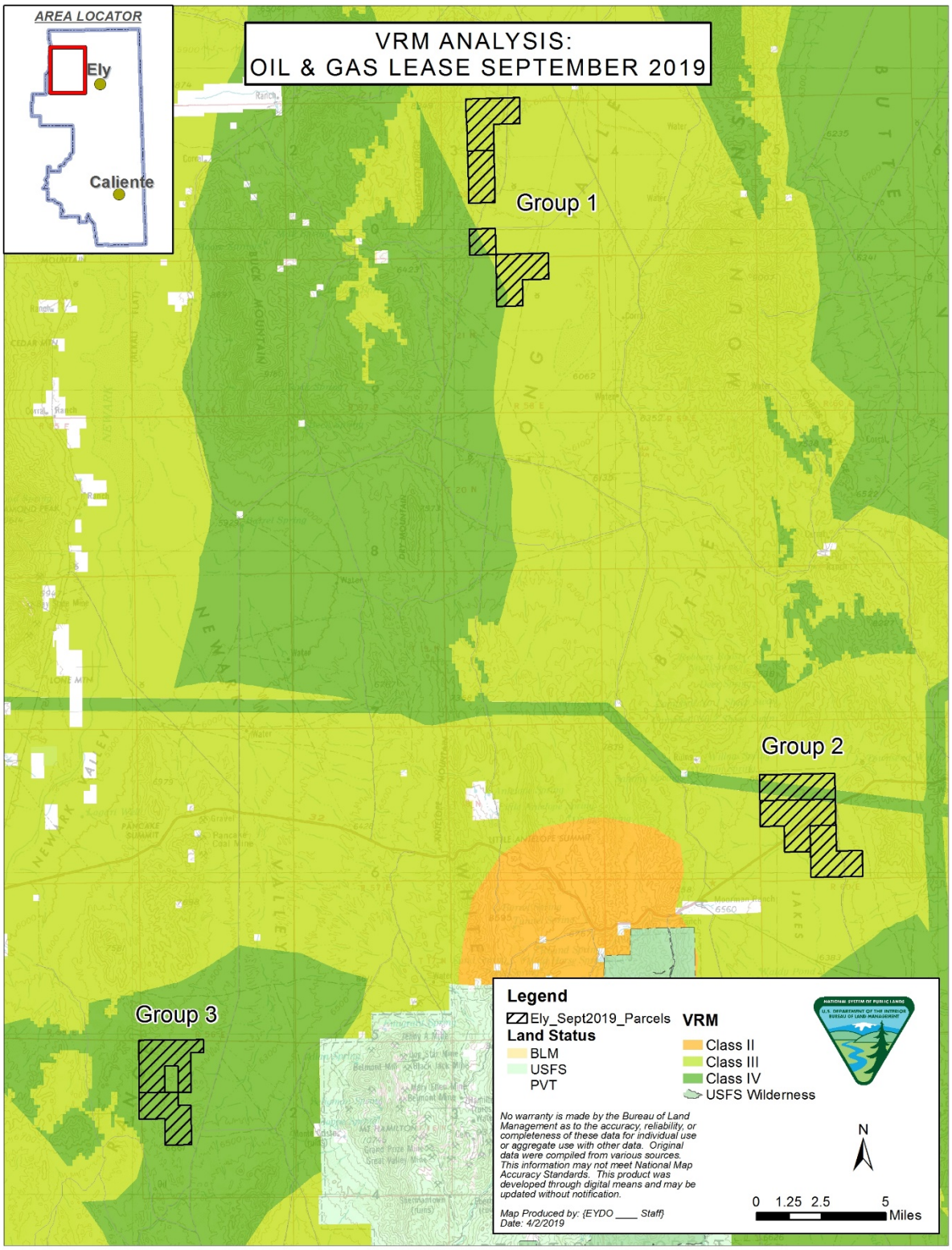
Appendix A – Maps


September 2019 Lease Sale
Greater Sage-grouse
Habitat Management Areas
Nominated Parcels
PHMA
GHMA
OHMA
0
3.5
7
Miles
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
Map Produced by: EYDO Planning Staff
Date: 4/3/2019
N
NV-19-09-2058
NV-19-09-2060
NV-19-09-2060
NV-19-09-2066
NV-19-09-2082
NV-19-09-2084
NV-19-09-2088
NV-19-09-1997
NV-19-09-2005
NEWARK VALLEY
BUTTE MOUNTAINS
LONG
SHELLBACK
WILDERNESS
Bureau of Land Management, National Operations Center, 1011, Mapping Group, OC-535


September 2019 Lease Sale
Greater Sage-grouse Nesting and Early Broodrearing Habitat
Nominated Parcels
GRSG Nesting & Early Broodrearing
0
3.5
7
Miles
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
Map Produced by: EYDO Planning Staff
Date: 4/3/2019
N
NV-19-09-2058
NV-19-09-2060
NV-19-09-2060
NV-19-09-2066
NV-19-09-2082
NV-19-09-2084
NV-19-09-2088
NV-19-09-1997
NV-19-09-2005
SHELLBACK
WILDERNESS
Bureau of Land Management, National Operations Center, 100K Mapping Group, OC-535


September 2019 Lease Sale
Greater Sage-grouse
Late Broodrearing Habitat
Nominated Parcels
GRSG Late Broodrearing
0
3.5
7
Miles
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
Map Produced by: EYDO Planning Staff
Date: 4/3/2019
N
NV-19-09-2058
NV-19-09-2060
NV-19-09-2060
NV-19-09-2066
NV-19-09-2082
NV-19-09-2084
NV-19-09-2088
NV-19-09-1997
NV-19-09-2005
SHELLBACK
WILDERNESS
Bureau of Land Management, National Operations Center, 199K Mapping Group, OC-535


September 2019 Lease Sale
Greater Sage-grouse
Winter Habitat
Nominated Parcels
GRSG Winter
0
3.5
7
Miles
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
Map Produced by: EYDO Planning Staff
Date: 4/3/2019
N
NV-19-09-2058
NV-19-09-2060
NV-19-09-2060
NV-19-09-2066
NV-19-09-2082
NV-19-09-2084
NV-19-09-2088
NV-19-09-1997
NV-19-09-2005
NEWARK VALLEY
BUCK MOUNTAIN
LONG BUTTE MOUNTAIN
BUTTE MOUNTAINS
WHITE PINE
JAKES VALLEY
SHELLBACK WILDERNESS
Bureau of Land Management, National Operations Center, 100K Mapping Group, OC-535


AREA LOCATOR
Ely
Caliente
VRM ANALYSIS:
OIL & GAS LEASE SEPTEMBER 2019
Group 1
Group 2
Group 3
Legend
Ely_Sept2019_Parcels
Land Status
BLM
USFS
PVT
VRM
Class II
Class III
Class IV
USFS Wilderness
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
Map Produced by: {EYDO ____ Staff}
Date: 4/2/2019
N
0 1.25 2.5 5
Miles

Appendix B – Supporting Tables

Table B1 BLM Special Status Species by Parcel[+]

Common Name	Scientific Name	Parcel Group							
		NV-19-09-1997	NV-19-09-2005	NV-19-09-2058	NV-19-09-2060	NV-19-09-2066	NV-19-09-2082	NV-19-09-2084	NV-19-09-2088
Birds									
Golden eagle	*Aquila chrysaetos*	X	X	X	X	X	X	X	X
Short-eared owl	*Asio flammeus*	X	X	X	X	X	X	X	X
Western burrowing owl	*Athene cunicularia hypugaea*	X	X	X	X	X	X	X	X
Ferruginous hawk	*Buteo regalis*	X	X	X	X				
Greater sage-grouse	*Centrocercus urophasianus*	X	X	X	X	X	X	X	X
Pinyon jay	*Gymnorhinus cyanocephalus*	X	X	X	X				
Loggerhead shrike	*Lanius ludovicianus*	X	X	X	X	X	X	X	X
Long-billed curlew	*Numenius americanus*	X	X	X	X	X			
Sage thrasher	*Oreoscoptes montanus*	X	X	X	X	X	X	X	X
Brewer's sparrow	*Spizella breweri*	X	X	X	X	X	X	X	X
Fish									
Newark Valley tui chub	*Gila bicolor newarkensis*								
Railroad Valley tui chub	*Siphateles bicolor spp.7*								
Relict dace	*Relictus solitarius*								
Railroad Valley springfish[*]	*Crenichthys nevadae*								
Amphibians									
Northern leopard frog	*Lithobates pipiens*								
Western toad	*Anaxyrus boreas*								
Mammals									
Pallid bat	*Antrozous pallidus*	X	X	X	X	X	X	X	X
Pygmy rabbit	*Brachylagus idahoensis*	X	X	X	X	X	X	X	X
Townsend's big-eared bat	*Corynorhinus townsendii*	X	X	X	X	X	X	X	X
Big brown bat	*Eptesicus fuscus*	X	X	X	X	X	X	X	X
Spotted bat	*Euderma maculatum*	X	X	X	X	X	X	X	X
Silver-haired bat	*Lasionycteris noctivagans*	X	X	X	X	X	X	X	X
Hoary bat	*Lasiurus cinereus*	X	X	X	X	X	X	X	X

Common Name	Scientific Name	Parcel Group							
		NV-19-09-1997	NV-19-09-2005	NV-19-09-2058	NV-19-09-2060	NV-19-09-2066	NV-19-09-2082	NV-19-09-2084	NV-19-09-2088
Dark kangaroo mouse	*Microdipodops megacephalus*						X	X	X
Pale kangaroo mouse	*Microdipodops pallidus*						X	X	X
California myotis	*Myotis californicus*	X	X	X	X	X	X	X	X
Western small-footed myotis	*Myotis ciliolabrum*	X	X	X	X	X	X	X	X
Long-eared myotis	*Myotis evotis*	X	X	X	X	X	X	X	X
Long-legged myotis	*Myotis volans*	X	X	X	X	X	X	X	X
Big free-tailed bat	*Nyctinomops macrotis*	X	X	X	X	X	X	X	X
Canyon bat	*Pipistrellus hesperus*	X	X	X	X	X	X	X	X
Brazilian free-tailed bat	*Tadarida brasiliensis*	X	X	X	X	X	X	X	X
Pocket gopher	*Thomomys bottae*	X	X	X	X	X	X	X	X
Reptiles									
Great Basin collared lizard	*Crotaphytus bicinctores*	X	X	X	X	X	X	X	X
Long-nosed leopard lizard	*Gambelia wislizenii*	X	X	X	X	X	X	X	X
Greater short-horned lizard	*Phyrnosoma hernandesi*	X	X	X	X	X	X	X	X
Desert horned lizard	*Phyrnosoma platyrhinos*	X	X	X	X	X	X	X	X
Molluscs									
Duckwater pyrg	*Pyrgulopsis aloba*								
Southern Duckwater pyrg	*Pyrgulopsis anatina*								
Big Warm Springs pyrg	*Pyrgulopsis papillata*								
Northern Steptoe pyrg	*Pyrgulopsis serrata*								

[+] Parcels will be re-evaluated for potential special status species at the time the BLM receives an APD. This list provides species that may potentially occur during the leasing period.

[*] Federally threatened species

Appendix C – Nominated Parcels

NV-19-09-1997 2382.420 Acres
T.0160N, R.0560E, 21 MDM, NV
Sec. 004 LOTS 3-4;
004 S2NW;
005 LOTS 1-4;
005 S2NE,S2NW,S2;
006 LOTS 1-7;
006 S2NE,SENW,E2SW,SE;
007 LOTS 1-4;
007 NE,E2NW,E2SW,SE;
008 E2;
White Pine County
Ely DO
PHMA GHMA

NV-19-09-2005 1755.200 Acres
T.0160N, R.0560E, 21 MDM, NV
Sec. 017 NW,S2;
018 LOTS 1-4;
018 E2,E2W2;
020 ALL;
White Pine County
Ely DO
PHMA GHMA

NV-19-09-2066 1924.240 Acres
T.0210N, R.0580E, 21 MDM, NV
Sec. 003 LOTS 1-4;
003 S2N2,S2;
004 LOTS 1-4;
004 S2N2,S2;
009 ALL;
White Pine County
Ely DO
PHMA

NV-19-09-2058 1917.770 Acres
T.0220N, R.0580E, 21 MDM, NV
Sec. 004 LOTS 1-4;
004 S2N2,S2;
005 LOTS 1-4;
005 S2N2,S2;
008 ALL;
White Pine County
Ely DO
PHMA GHMA OHMA

NV-19-09-2060 1920.000 Acres
T.0220N, R.0580E, 21 MDM, NV
Sec. 017 ALL;
020 ALL;
032 ALL;
White Pine County
Ely DO
PHMA GHMA OHMA

NV-19-09-2082 1916.560 Acres
T.0180N, R.0600E, 21 MDM, NV
Sec. 016 ALL;
017 ALL;
018 LOTS 1-4;
018 E2,E2W2;
White Pine County
Ely DO
PHMA GHMA

NV-19-09-2084 2508.040 Acres
T.0180N, R.0600E, 21 MDM, NV
Sec. 019 LOTS 1-4;
019 E2,E2W2;
020 ALL;
021 ALL;
029 ALL;
White Pine County
Ely DO
PHMA

NV-19-09-2088 1920.000 Acres
T.0180N, R.0600E, 21 MDM, NV
Sec. 028 ALL;
033 ALL;
034 ALL;
White Pine County
Ely DO
PHMA

Number of Parcels - 8

Total Acreage – 16,244.230

Total number of Parcels with Presale Offers - 0

Parcel Number of Parcels with Presale Offers - 0

Total Acreage With Presale Offers - 0

Any portion of the listed lands may be deleted upon determination that such lands are not available for leasing.

Appendix D – Stipulations and Lease Notices

Stipulations and Lease Notices

Stipulations are restrictions that are included in the current applicable land use plan – the Ely RMP.

Lease Notices serve to inform prospective lessees of other regulatory authorities that may apply to a parcel.

BLM Nevada Standard Lease Notices

(#NV-L-00-A-LN)

These stipulations and notices apply to all parcels all lands and represent standard Best Management Practices for ensuring compliance with extant Federal Laws and resource protection.

T&E, Sensitive and Special Status Species
The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. §1531 et seq., including completion of any required procedure for conference or consultation.

Migratory Birds
The Operator is responsible for compliance with provisions of the Migratory Bird Treaty Act by implementing measures to prevent take of migratory birds. Operators should be aware that any ground clearing or other disturbance (such as creating cross-country access to sites, drilling, and/or construction) during the migratory bird (including raptors) nesting season (March 1 - July 31) risks a violation of the Migratory Bird Treaty Act. Disturbance to nesting migratory birds should be avoided by conducting surface disturbing activities outside the migratory bird nesting season.
If surface disturbing activities must be implemented during the nesting season, a preconstruction survey for nesting migratory birds should be performed by a qualified wildlife biologist, during the breeding season (if work is not completed within a specified time frame, then additional surveys may be needed). If active nests are found, an appropriately-sized no surface disturbance buffer determined in coordination with the BLM biologist should be placed on the active nest until the nesting attempt has been completed. If no active nests are found, construction activities must occur within the survey validity time frame specified in the conditions of approval.

Cultural Resources and Tribal Consultation
This lease may be found to contain historic properties and/or resources protected under the
National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, Executive Order 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations (e.g., State Historic Preservation Officer (SHPO) and tribal consultation) under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated.

Fossils
This area has low to moderate potential for vertebrate paleontological resources, unless noted to have higher potential in a separate stipulation. This area may contain vertebrate paleontological resources. Inventory and/or on-site monitoring during disturbance or spot checking may be required of the operator. In the event that previously undiscovered paleontological resources are discovered in the performance of any surface disturbing activities, the

item(s) or condition(s) will be left intact and immediately brought to the attention of the authorized officer of the BLM. Operations within 250 feet of any such discovery will not be resumed until written authorization to proceed is issued by the Authorized Officer. The lessee will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils of significant scientific interest discovered during the operations.

Water
The Operator is responsible for compliance with provisions of the Clean Water Act, Safe Drinking Water Act, and applicable State laws and regulations regarding protection of state water resources. Operators should contact Nevada Division of Water Resources and Nevada Division of Environmental Protection regarding necessary permits and compliance measures for any construction or other activities.

Mining Claims
This parcel may contain existing mining claims and/or mill sites located under the 1872 Mining Law. To the extent it does, the oil and gas lessee must conduct its operations, so far as reasonably practicable, to avoid damage to any known deposit of any mineral for which any mining claim on this parcel is located, and should not endanger or unreasonably or materially interfere with the mining claimant's operations, including any existing surface or underground improvements, workings, or facilities which may have been made for the purpose of mining operations. The provisions of the Multiple Mineral Development Act (30 U.S.C. 521 et seq.) shall apply on the leased lands.

Fire
The following precautionary measures should be taken to prevent wildland fires. In the event your operations should start a fire, you could be held liable for all suppression costs.

- All vehicles should carry fire extinguishers and a minimum of 10 gallons of water.
- Adequate fire-fighting equipment i.e. shovel, Pulaski, extinguisher(s) and a minimum 10 gallons of water should be kept at the drill site(s).
- Vehicle catalytic converters should be inspected often and cleaned of all brush and grass debris.
- When conducting welding operations, they should be conducted in an area free from or mostly free from vegetation. A minimum of 10 gallons water and a shovel should be on hand to extinguish any fires created from the sparks. Extra personnel should be at the welding site to watch for fires created by welding sparks.
- Report wildland fires immediately to the BLM Central Nevada Interagency Dispatch Center (CNIDC) at (775) 623-3444. Helpful information to reported is location (latitude and longitude if possible), what's burning, time started, who/what is near the fire and direction of fire spread.
- When conducting operations during the months of May through September, the operator must contact the BLM Ely District Office, Division of Fire and Aviation at (775 289-1800) to find out about any fire restrictions in place for the area of operation and to advise this office of approximate beginning and ending dates for your activities.

Parcel #	Legal Land Description
ALL	ALL

OIL AND GAS
September 2019 EA
Stipulations and Lease Notices – WILDLIFE ONLY

Stipulation – Raptor Nest Sites
(#NV-L-06-B-TL)

Stipulation: Timing Limitation. No surface activity from May 1 through July 15 within 0.5 mile of a raptor nest site which has been active within the past five years.

Objective [Purpose]: To protect raptor nesting activities necessary to maintaining the critical life stages of existing raptor populations.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect raptor nest sites being protected by the restriction. An exception may also be granted if the proponent, BLM, and other affected interests, in consultation with Nevada Department of Wildlife, negotiate mitigation that would satisfactorily offset the anticipated impacts. An exception may be granted for actions designed to enhance the long-term utility or availability of the habitat.

Modification: The boundaries of the stipulated area may be modified if the authorized officer, in consultation with Nevada Department of Wildlife, determines that portions of the area can be occupied without adversely affecting raptor nesting activity. The dates for the timing restriction may be modified if new information indicates the dates are not valid for the leasehold. Any modification authorized by this stipulation is subject to 43 C.F.R. 3101.1-4, including provisions requiring public review for issues of major public concern, or substantial modifications.

Waiver: The stipulation may be waived if the authorized officer, in consultation with Nevada Department of Wildlife determines that the entire leasehold no longer contains raptor nest sites. Any waiver authorized by this stipulation is subject to 43 C.F.R. 3101.1-4, including provisions requiring public review for issues of major public concern, or substantial waivers.

Parcel #	**Legal Land Description**
	Mount Diablo Meridian, Nevada
ALL	ALL LANDS

Lease Notice – Greater Sage Grouse (GRSG) in
Priority Habitat Management Area (PHMA)
(SG-02-NV-OG-NSO)

Stipulation: No Surface Occupancy (NSO) –Priority Habitat Management Areas (PHMA) – Manage oil and gas resources in Nevada as NSO, with the following exceptions.

Objective [Purpose]: To protect GRSG in PHMA.

Exception: The State Director may grant an exception to the allocations and stipulations if one of the following applies (in coordination with NDOW, SETT):

The location of the proposed authorization is determined to be unsuitable (by a biologist with GRSG experience using methods such as Stiver et al 2015) and lacks the ecological potential to become marginal or suitable habitat; and would not result in direct, indirect, or cumulative impacts on GRSG and its habitat. Management allocation decisions would not apply to those areas determined to be unsuitable because the area lacks the ecological potential to become marginal or suitable habitat, and/or

The proposed activity's impacts could be offset to result in no adverse impacts on GRSG or its habitat, through use of the mitigation hierarchy consistent with Federal law and the state's mitigation policies and programs, such as the State of Nevada's Executive Order 2018-32 (and any future regulations developed to implement this order). In cases where exceptions may be granted for projects with a residual impact, voluntary compensatory mitigation consistent with the State's mitigation policies and programs, such as the State of Nevada's Executive Order 2018-32 (and any future regulations developed to implement this order) would be one mechanism by which a proponent achieves the Approved RMP Amendment goals, objectives, and exception criteria. When a proponent volunteers compensatory mitigation as their chosen approach to address residual impacts, the BLM can incorporate those actions into the rationale used to grant an exception. The final decision to grant a waiver, exception, or modification would be based, in part, on criteria consistent with the State's GRSG management plans and policies.

Modification: The authorized officer, in coordination with the appropriate state wildlife agency (NDOW, and/or CDFW), can modify and/or waive dates for seasonal timing restrictions based on the criteria described below, based on site-specific information that indicates:

A project proposal's NEPA analysis and/or project record, and correspondence from NDOW, demonstrates that any modification (shortening/extending seasonal timeframes or waiving the seasonal timing restrictions all together) is justified on the basis that it serves to better protect or enhance GRSG and its habitat than if the strict application of seasonal timing restrictions are implemented. Under this scenario modifications can occur if:

A proposed authorization would have beneficial or neutral impacts on GRSG and its habitat.

Topography or other factors eliminate direct and indirect impacts from visibility and audibility to GRSG and its habitat.

There are documented local variations (e.g., higher/lower elevations) and/or annual climatic fluctuations (e.g., early/late spring, long/heavy winter) that indicate the seasonal life cycle periods are different than presented, or that GRSG are not using the area during a given seasonal life cycle period.

Modifications are needed to address an immediate public health and safety concern in a timely manner (e.g., maintaining a road impacted by flooding).

Waiver: The stipulation may be waived if the authorized officer, in consultation with the appropriate state wildlife agency (NDOW), determines that the entire leasehold is within unsuitable habitat (see exceptions above) and would not result in direct, indirect, or cumulative impacts to GRSG and/or its habitat.

Parcel #	**Legal Land Description**
	Mount Diablo Meridian, Nevada
NV-19-09-1997	T. 0160 N., R. 0560 E., MDM, NV Sec. 004 SWNW; Sec. 005 Lots 1 thru 3, S2NE, S2NW, S2; Sec. 007 SESE; Sec. 008 E2;
NV-19-09-2005	T. 0160 N., R. 0560 E., MDM, NV Sec. 017 ALL; Sec. 018 Lots 1 thru 4, E2, E2NW, E2SW; Sec. 020 N2, E2SW, SE;
NV-19-09-2058	T. 0220 N., R. 0580 E., MDM, NV Sec. 004 ALL; Sec. 005 Lots 1 and 2, S2NE, SE; Sec. 008 NENE, S2NE, N2SE, SESE;
NV-19-09-2058	T. 0220 N., R. 0580 E., MDM, NV Sec. 004 ALL; Sec. 005 Lots 1 and 2, S2NE, SE; Sec. 008 NENE, S2NE, N2SE, SESE;
NV-19-09-2060	T. 0220 N., R. 0580 E., MDM, NV Sec. 020 S2; Sec. 032 ALL;
NV-19-09-2066	T. 0210 N., R. 0580 E., MDM, NV Sec. 003 Lots 2 thru 4; Sec. 004 ALL; Sec. 009 N2, SW, W2SE;
NV-19-09-2082	T. 0180 N., R. 0600 E., MDM, NV ALL LANDS
NV-19-09-2084	T. 0180 N., R. 0600 E., MDM, NV ALL LANDS
NV-19-09-2088	T. 0180 N., R. 0600 E., MDM, NV ALL LANDS

Lease Notice – Greater Sage Grouse (GRSG) Lekking Habitat –
General Habitat Management Area (GHMA)
(SG-03-TL)

Stipulation: Timing Limitation (TL) - Seasonal protection within 4.0 miles of active or pending GRSG leks in General Management Areas (GHMA) – Manage fluid mineral resources with timing limitations. NSO would be allowed within 4.0 miles of active or pending GRSG leks from March 1 through May 15.

Objective [Purpose]: To protect GRSG lekking habitat.

Exception: The Authorized Officer may grant an exception where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the action, as proposed or otherwise restricted, does not adversely affect GRSG or its habitat. An exception may also be granted if the proponent, the BLM, and the appropriate state agency negotiate mitigation that would provide a clear net conservation gain to GRSG and its habitat.

Modification: The Authorized Officer may modify the size and shape of the restricted area or the period of limitation where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the action, as proposed or otherwise restricted, does not adversely affect GRSG or its habitat.

Waiver: The Authorized Officer may wave the stipulation where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the described lands do not contain GRSG or suitable habitat or are otherwise incapable of serving the requirements of GRSG and therefore no longer warrant consideration as a component necessary for their protection.

Parcel #	**Legal Land Description**
	Mount Diablo Meridian, Nevada
NV-19-09-2058	T. 0220 N., R. 0580 E., MDM, NV Sec. 005 Lots 2 thru 4, SWNE, S2NW, SW, W2SE, SESE; Sec. 008 NE, N2NW, SENW;
NV-19-09-2066	T. 0210 N., R. 0580 E., MDM, NV Sec. 003 Lots 1 thru 3, S2NE, S2NW, S2; Sec. 004 SESE; Sec. 009 NENE, S2NE, SESW, SE;

Lease Notice – Greater Sage Grouse (GRSG) Winter Habitat –
General Habitat Management Area (GHMA)
(SG-04-TL)

Stipulation: Timing Limitation (TL) – No surface occupancy would be allowed in GRSG winter habitat from November 1 through February 28 in GHMA.

Objective [Purpose]: To protect GRSG winter habitat.

Exception: The Authorized Officer may grant an exception where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the action, as proposed or otherwise restricted, does not adversely affect GRSG or its habitat. An exception may also be granted if the proponent, the BLM, and the appropriate state agency negotiate mitigation that would provide a clear net conservation gain to GRSG and its habitat.

Modification: The Authorized Officer may modify the size and shape of the restricted area or the period of limitation where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the action, as proposed or otherwise restricted, does not adversely affect GRSG or its habitat.

Waiver: The Authorized Officer may wave the stipulation where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the described lands do not contain GRSG or suitable habitat or are otherwise incapable of serving the requirements of GRSG and therefore no longer warrant consideration as a component necessary for their protection.

Parcel #	**Legal Land Description**
	Mount Diablo Meridian, Nevada
NV-19-09-1997	T. 0160 N., R. 0560 E., MDM, NV Sec. 004 Lots 3 and 4, S2NW; Sec. 005 Lots 1, 3 and 4, SENE, S2NW, W2SW; Sec. 006 Lot 1, SENE, NESE, S2SE; Sec. 007 Lots 3 and 4, E2, E2SW; Sec. 008 NE, NWSE;
NV-19-09-2005	T. 0160 N., R. 0560 E., MDM, NV Sec. 017 NWNW; Sec. 018 Lots 1 thru 4, N2NE, E2NW, SESW; Sec. 020 N2NW, SW;
NV-19-09-2058	T. 0220 N., R. 0580 E., MDM, NV Sec. 005 Lots 2 thru 4, SWNE, S2NW, SW, W2SE, SESE; Sec. 008 NE, N2NW, SENW;
NV-19-09-2060	T. 0220 N., R. 0580 E., MDM, NV Sec. 020 SWSW;

NV-19-09-2066	T. 0210 N., R. 0580 E., MDM, NV Sec. 003 Lots 1 thru 3, S2NE, S2NW, S2; Sec. 004 SESE; Sec. 009 NENE, S2NE, SESW, SE;

Lease Notice – Greater Sage Grouse (GRSG) Early Brood-rearing Habitat –
General Habitat Management Area (GHMA)
(SG-05-TL)

Stipulation: Timing Limitation (TL) - No surface occupancy would be allowed in GRSG early brood-rearing habitat from May 15 through June 15 in GHMA.

Objective [Purpose]: To protect GRSG early brood rearing habitat.

Exception: The Authorized Officer may grant an exception where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the action, as proposed or otherwise restricted, does not adversely affect GRSG or its habitat. An exception may also be granted if the proponent, the BLM, and the appropriate state agency negotiate mitigation that would provide a clear net conservation gain to GRSG and its habitat.

Modification: The Authorized Officer may modify the size and shape of the restricted area or the period of limitation where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the action, as proposed or otherwise restricted, does not adversely affect GRSG or its habitat.

Waiver: The Authorized Officer may wave the stipulation where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the described lands do not contain GRSG or suitable habitat or are otherwise incapable of serving the requirements of GRSG and therefore no longer warrant consideration as a component necessary for their protection.

Parcel #	**Legal Land Description**
	Mount Diablo Meridian, Nevada
NV-19-09-1997	T. 0160 N., R. 0560 E., MDM, NV Sec. 005 Lot 3, SENW, W2SW; Sec. 006 E2SE; Sec. 007 E2NE, E2SE; Sec. 008 NWSE;
NV-19-09-2005	T. 0160 N., R. 0560 E., MDM, NV Sec. 017 NWNW; Sec. 018 Lots 2 thru 4, SESW; Sec. 020 N2SW, SESW;
NV-19-09-2058	T. 0220 N., R. 0580 E., MDM, NV Sec. 005 Lots 2 and 3, SWNE, SENW, E2SW W2SE, SESE; Sec. 008 NE, E2NW, NESW, NWSE;
NV-19-09-2060	T. 0220 N., R. 0580 E., MDM, NV Sec. 020 SWNW, NWSW;

Lease Notice – Greater Sage Grouse (GRSG) Late Brood-rearing Habitat –
General Habitat Management Area (GHMA)
(SG-06-TL)

Stipulation: Timing Limitation (TL) -No surface occupancy would be allowed in GRSG late brood-rearing habitat from June 15 through September 15 in GHMA.

Objective [Purpose]: To protect GRSG late brood rearing habitat.

Exception: The Authorized Officer may grant an exception where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the action, as proposed or otherwise restricted, does not adversely affect GRSG or its habitat. An exception may also be granted if the proponent, the BLM, and the appropriate state agency negotiate mitigation that would provide a clear net conservation gain to GRSG and its habitat.

Modification: The Authorized Officer may modify the size and shape of the restricted area or the period of limitation where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the action, as proposed or otherwise restricted, does not adversely affect GRSG or its habitat.

Waiver: The Authorized Officer may wave the stipulation where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the described lands do not contain GRSG or suitable habitat or are otherwise incapable of serving the requirements of GRSG and therefore no longer warrant consideration as a component necessary for their protection.

Parcel #	**Legal Land Description**
	Mount Diablo Meridian, Nevada
NV-19-09-1997	T. 0160 N., R. 0560 E., MDM, NV Sec. 004 ALL; Sec. 005 Lot 1, SENE;
NV-19-09-2058	T. 0220 N., R. 0580 E., MDM, NV Sec. 005 Lot 2, SWNE, NWSE; Sec. 008 NE, NWSE;
NV-19-09-2060	T. 0220 N., R. 0580 E., MDM, NV Sec. 020 SWNW, W2SW;
NV-19-09-2066	T. 0210 N., R. 0580 E., MDM, NV Sec. 003 Lots 1 thru 3, S2NE, S2NW, S2; Sec. 004 SESE; Sec. 009 NE, S2NE, SE;

Lease Notice – Greater Sage Grouse (GRSG)
Lek Sites, Noise
(SG-08-CSU)

Stipulation - Controlled Surface Use (CSU): Authorizations/permits would limit noise from discretionary activities (during construction, operation, or maintenance) to not exceed 10 decibels above ambient sound levels at 0.25 miles from active and pending leks from 2 hours before to 2 hours after sunrise and sunset during the breeding season from March 1 through May 15.

Objective [Purpose]: To protect GRSG lek sites.

Exception: None

Modification: None

Waiver: None

Parcel #	**Legal Land Description**
	Mount Diablo Meridian, Nevada
NV-19-09-2058	T. 0220 N., R. 0580 E., MDM, NV Sec. 004 Lots 1 thru 4, S2NE, S2NW, N2SW, SESW, SE; Sec. 005 Lots 1 thru 3, S2NE, NESE
NV-19-09-2060	T. 0220 N., R. 0580 E., MDM, NV Sec. 032 S2;
NV-19-09-2066	T. 0210 N., R. 0580 E., MDM, NV Sec. 003 W2SW; Sec. 004 Lots 2 thru 4, S2NE, N2NW, S2; Sec. 009 ALL;
NV-19-09-2084	T. 0180 N., R. 0600 E., MDM, NV Sec. 019 SESW, S2SE; Sec. 020 S2SW, S2SE; Sec. 021 S2SW, SWSE; Sec. 029 ALL;
NV-19-09-2088	T. 0180 N., R. 0600 E., MDM, NV ALL LANDS

Lease Notice – Greater Sage Grouse (GRSG)
Lek Sites, Buffer Distances

(SG-09-CSU)

Stipulation – Controlled Surface Use (CSU): The BLM will apply lek buffer distances specified as the lower end of the interpreted range in the report unless justifiable departures are determined to be appropriate (see below). The lower end of the interpreted range of the lek buffer distances is as follows:

Linear features (roads) within 3.1 miles of leks

Infrastructure related to energy development within 3.1 miles of leks

Tall structures (e.g., communication or transmission towers and transmission lines) within 2 miles of leks

Low structures (e.g., fences and rangeland structures) within 1.2 miles of leks.

Surface disturbance (continuing human activities that alter or remove the natural vegetation) within 3.1 miles of leks.

Noise and related disruptive activities, including those that do not result in habitat loss (e.g., motorized recreational events) at least 0.25 mile from leks.

Objective [Purpose]: To protect GRSG leks.

Exception: Justifiable departures to decrease or increase from these distances, based on local data, best available science, landscape features, and other existing protections (e.g., land use allocations and state regulations) may be appropriate for determining activity impacts. The USGS report recognized "that because of variation in populations, habitats, development patterns, social context, and other factors, for a particular disturbance type, there is no single distance that is an appropriate buffer for all populations and habitats across the sage-grouse range." The USGS report also states that "various protection measures have been developed and implemented [which have] the ability (alone or in concert with others) to protect important habitats, sustain populations, and support multiple-use demands for public lands." All variation in lek buffer distances will require appropriate analysis and disclosure as part of activity authorization.

Modification: None

Waiver: None

Parcel #	**Legal Land Description**
	Mount Diablo Meridian, Nevada
NV-19-09-2058	T. 0220 N., R. 0580 E., MDM, NV Sec. 004 Lots 1 thru 4, S2NE, S2NW, N2SW, SESW, SE; Sec. 005 Lots 1 thru 3, S2NE, NESE;
NV-19-09-2060	T. 0220 N., R. 0580 E., MDM, NV Sec. 032 S2;
NV-19-09-2066	T. 0210 N., R. 0580 E., MDM, NV Sec. 003 W2SW; Sec. 004 Lots 2 thru 4, S2NE, N2NW, S2; Sec. 009 ALL;

Parcel #	**Legal Land Description**
	Mount Diablo Meridian, Nevada
NV-19-09-2084	T. 0180 N., R. 0600 E., MDM, NV Sec. 019 SESW, S2SE; Sec. 020 S2SW, S2SE; Sec. 021 S2SW, SWSE; Sec. 029 ALL;
NV-19-09-2088	T. 0180 N., R. 0600 E., MDM, NV ALL LANDS

Lease Notice – Greater Sage Grouse (GRSG)
Priority Habitat Management Area (PHMA) Disturbance Cap
(SG-NV-10-CSU)

Stipulation – Controlled Surface Use (CSU): New development/activity would not exceed the 3% disturbance cap protocol at either the biologically significant unit (BSU) or project scale in PHMA, unless a technical team (described under the exception) determines that new or site-specific information indicates the project could be modified to result in a net conservation gain at the BSU level.

Objective [Purpose]: To create a net conservation gain at the project and BSU level.

Exception: Nevada lands only – Any exceptions to the disturbance cap may be approved by the Authorized Officer only with the concurrence of the State Director. The Authorized Officer may not grant an exception unless the NDOW, the USFWS, and the BLM unanimously find that the proposed action satisfies the conditions stated in the stipulation. Initially, the technical team would make such finding; the team consists of a field biologist or other GRSG expert from each respective agency. In the event the initial finding were not unanimous, the finding may be elevated to the BLM State Director, USFWS State Ecological Services Director, and NDOW Director for final resolution. In the event their recommendation were not unanimous to grant the exception, the exception would not be granted.

Modification: None

Waiver: None

Parcel #	**Legal Land Description**
	Mount Diablo Meridian, Nevada
NV-19-09-1997	T. 0160 N., R. 0560 E., MDM, NV Sec. 004 SWNW; Sec. 005 Lots 1 thru 3, S2NE, S2NW, S2; Sec. 007 SESE; Sec. 008 E2;
NV-19-09-2005	T. 0160 N., R. 0560 E., MDM, NV Sec. 017 ALL; Sec. 018 Lots 1 thru 4, E2, E2NW, E2SW; Sec. 020 N2, E2SW, SE;
NV-19-09-2058	T. 0220 N., R. 0580 E., MDM, NV Sec. 004 ALL; Sec. 005 Lots 1 and 2, S2NE, SE; Sec. 008 NENE, S2NE, N2SE, SESE;
NV-19-09-2060	T. 0220 N., R. 0580 E., MDM, NV Sec. 020 S2; Sec. 032 ALL;
NV-19-09-2066	T. 0210 N., R. 0580 E., MDM, NV Sec. 003 Lots 2 thru 4; Sec. 004 ALL; Sec. 009 N2, SW, W2SE;
NV-19-09-2082	T. 0180 N., R. 0600 E., MDM, NV ALL LANDS

Parcel #	**Legal Land Description**
	Mount Diablo Meridian, Nevada
NV-19-09-2084	T. 0180 N., R. 0600 E., MDM, NV ALL LANDS
NV-19-09-2088	T. 0180 N., R. 0600 E., MDM, NV ALL LANDS

Appendix E – Ely District Best Management Practices for Oil & Gas

Air Resources

1. Use dust abatement techniques on unpaved, un-vegetated surfaces to minimize airborne dust.

2. Post and enforce speed limits (e.g., 25 miles per hour) to reduce airborne fugitive dust.

3. Cover construction materials and stockpiled soils if they are a source of fugitive dust.

4. Use dust abatement techniques before and during surface clearing, excavation, or blasting activities.

Water Resources

1. Avoid the application of fire retardant or foam within 300 feet of a stream channel or waterway, when possible, except for the protection of life and property. Aerial application and use of retardants and foams would be consistent with national policy guidelines established by the National Office of Fire and Aviation, as amended.

2. Fire engines that have surfactant foam mixes in tanks must be fitted with an anti-siphon (back flow protection valve) if filled directly from a stream channel.

3. Construct a containment barrier around all pumps and fuel containers utilized within 100 feet (30.5 meters) of a stream channel. The containment barrier would be of sufficient size to contain all fuel being stored or used on site.

4. Prior to use on lands administered by the Ely Field Office, all fire suppression equipment from outside the planning area utilized to extract water from lakes, streams, ponds, or spring sources (e.g., helicopter buckets, draft hoses, and screens) will be thoroughly rinsed to remove mud and debris and then disinfected to prevent the spread of invasive aquatic species. Rinsing equipment with disinfectant solution will not occur within 100 feet of natural water sources (i.e., lakes, streams, or springs). Ely suppression equipment utilized to extract water from water sources known to be contaminated with invasive aquatic species, as identified by the U.S. Fish and Wildlife Service and Nevada Department of Wildlife, also will be disinfected prior to use elsewhere on lands administered by the Ely Field Office.

5. Do not dump surfactant foam mixes from fire engines within 600 feet of a stream channel.

6. Do not conduct fire retardant mixing operations within 600 feet of a stream channel.

7. Remove all modifications made to impound or divert stream flow by mechanical or other means to facilitate extraction of water from a stream for fire suppression efforts when suppression efforts are completed.

8. When drafting or dipping water during fire operations, continuously monitor water levels at the site that water is being removed from. Do not allow water extraction to exceed the ability of the recharge inflow to maintain the water levels that exist at the time initial attack efforts began.

If the water level drops below this predetermined level, all water removal would cease immediately until water levels are recharged.

9. When possible, do not cross or terminate fire control lines at the stream channel. Terminate control lines at the edge of the riparian zone at a location determined appropriate to meet fire suppression objectives based on fire behavior, vegetation/fuel types, and fire fighter safety.

10. Construct access roads and fords that cross stream channels to BLM road standards.

11. Do not construct new roads or mechanical fire control lines or improve existing roads within 300 feet of a stream channel unless authorized by the BLM Field Manager or Authorized Officer.

12. Limit stream crossings on travel routes and trails to the minimal number necessary to minimize sedimentation and compaction. The BLM Authorized Officer will determine if any impacts need to be rehabilitated by the permittee.

13. Conduct mixing of herbicides and rinsing of herbicide containers and spray equipment only in areas that are a safe distance from environmentally sensitive areas and points of entry to bodies of water (storm drains, irrigation ditches, streams, lakes, or wells).

14. A water well may be accepted by the BLM Ely Field Office upon completion of operations. The BLM authorized officer will make the determination whether to accept the well based upon the submission of the well completion forms and relevant hydrogeologic data reports. The well must be installed by drillers licensed by the state of Nevada according to specifications in Nevada Revised Statutes Title 48, Chapter 534.

Soil Resources

1. Require the use of specialized low-surface impact equipment (e.g., balloon tired vehicles) or helicopters, as determined by the BLM Authorized Officer, for activities in off-road areas where it is deemed necessary to protect fragile soils and other resource values.

2. During periods of adverse soil moisture conditions caused by climatic factors such as thawing, heavy rains, snow, flooding, or drought, suspend activities on existing roads that could create excessive surface rutting. When adverse conditions exist, the operator would contact the BLM Authorized Officer for an evaluation and decision based on soil types, soil moisture, slope, vegetation, and cover.

3. When preparing the site for reclamation, include contour furrowing, terracing, reduction of steep cut and fill slopes, and the installation of water bars, as determined appropriate for site-specific conditions.

4. Upon completion or temporary suspension of mining operations, backfill all holes and trenches and re-contour the pit to the natural slope, if possible, with pit walls greater than 3 feet in height knocked down and sloped at 3 horizontal to 1 vertical or to the original topography, whichever is less.

5. Restoration requirements include reshaping, re-contouring, and/or resurfacing with topsoil, installation of water bars, and seeding on the contour. Removal of structures such as culverts, concrete pads, cattle guards, and signs would usually be required. Fertilization and/or fencing of the disturbance may be required. Additional erosion control measures (e.g., fiber matting and barriers) to discourage road travel may be required.

Vegetation Resources

1. Where seeding is required, use appropriate seed mixture and seeding techniques approved by the BLM Authorized Officer.

2. The BLM Authorized Officer will specify required special handling and recovery techniques for Joshua trees, yucca, and some cactus in the southern part of the planning area on a site-specific basis.

3. Keep removal and disturbance of vegetation to a minimum through construction site management (e.g., using previously disturbed areas and existing easements, limiting equipment/materials storage and staging area sites, etc.).

4. Generally, conduct reclamation with native seeds that are representative of the indigenous species present in the adjacent habitat. Document rationale for potential seeding with selected nonnative species. Possible exceptions would include use of nonnative species for a temporary cover crop to out-complete weeds. In all cases, ensure seed mixes are approved by the BLM Authorized Officer prior to planting.

5. Certify that all interim and final seed mixes, hay, straw, and hay/straw products are free of plant species listed on the Nevada noxious weed list.

6. An area is considered to be satisfactorily reclaimed when all disturbed areas have been recontoured to blend with the natural topography, erosion has been stabilized, and an acceptable vegetative cover has been established. Use the Nevada Guidelines for Successful Revegetation prepared by the Nevada Division of Environmental Protection, the BLM, and the U.S. Department of Agriculture Forest Service (or most current revision or replacement of this document) to determine if revegetation is successful.

7. Reclamation bond release criteria would include the following:

8. The perennial plant cover of the reclaimed area would equal or exceed perennial cover of selected comparison areas (normally adjacent habitat). If the adjacent habitat is severely disturbed, an ecological site description may be used as a cover standard. Cover is normally crown cover as estimated by the point intercept method. Selected cover can be determined using a method as described in Sampling Vegetation Attributes, Interagency Technical Reference, 1996, BLM/RS/ST-96/002+1730. The reclamation plan for the area project would identify the site-specific release criteria and associated statistical methods in the reclamation plan or permit.

9. Utility companies will manage vegetation in their rights-of-way for safe and reliable

operation while maintaining vegetation and wildlife habitat.

10. Re-spread weed-free vegetation removed from the right-of-way to provide protection, nutrient recycling, and seed source.

Fish and Wildlife

1. Install wildlife escape ramps in all watering troughs, including temporary water haul facilities, and open storage tanks. Pipe the overflow away from the last water trough on an open system to provide water at ground level.

2. As appropriate, mark certain trees on BLM-administered lands for protection as wildlife trees.

3. Consider seasonal distribution of large wildlife species when determining methods used to accomplish weed and insect control objectives.

4. Protect active raptor nests in undisturbed areas within 0.25 mile of areas proposed for vegetation conversion using species-specific protection measures. Inventory areas containing suitable nesting habitat for active raptor nests prior to the initiation of any project.

5. When used to pump water from any pond or stream, screen the intake end of the draft hose to prevent fish from being ingested. Screen opening size would be a maximum of 3/16 inch (4.7 millimeters).

6. Special recreation use permittees will take action to ensure that race participants and spectators do not harass wildlife.

Special Status Species

1. Avoid line-of-sight views between the power poles along powerlines and sage grouse leks, whenever feasible.

2. Use current science, guidelines, and methodologies (Avian Power Line Interaction Committee 1994, 1996, 2005) for all new and existing powerlines to minimize raptor and other bird electrocution and collision potential.

3. When managing weeds in areas of special status species, carefully consider the impacts of the treatment on such species. Wherever possible, hand spraying of herbicides is preferred over other methods.

4. Do not conduct noxious and invasive weed control within 0.5 mile of nesting and brood rearing areas for special status species during the nesting and brood rearing season.

5. To the greatest extent possible, survey all mine adits and shafts slated for closure for bat presence and use prior to being closed. Minimize impacts to bat roosts and bat habitat through the use of current science, guidelines, and methodologies when closing and abandoning mine adits.

6. Develop grazing systems to minimize conflicts with special status species habitat.

7. For streams currently occupied by any special status species, do not allow extraction of water

from ponds or pools if stream inflow is minimal (i.e., during drought situations) and extraction of water would lower the existing pond or pool level.

8. When new spring developments are constructed on BLM lands and BLM has the authority to design the project, the source and surrounding riparian area will be fenced, the spring will be developed in a manner that leaves surface water at the source and maintains the associated riparian area, water will be provided outside the exclosure in a manner that provides drinking water for large ungulates, wild horses, and/or livestock so they are less likely to break into the exclosure.

9. Salt and mineral supplements:

- Base placement of salt and mineral supplements on site-specific assessment.
- Normally place salt and mineral supplements at least 0.5 mile away from riparian areas, sensitive sites, populations of special status plant species, cultural resource sites.
- Place salt at least 0.5 mile from any water source including troughs.
- Place salt and mineral supplements at least 1 mile from sage grouse leks.

Water hauling:

- Place water haul sites at least 0.5 mile away from riparian areas, cultural sites, and special status species locations.
- Limit water hauling to existing roads when possible.

Wild Horses

1. To protect wild horses and wildlife flag all new fences every 16 feet with white flagging that is at least 1 inch wide and has at least 12 inches hanging free from the top wire of the fence.

2. If a project involves heavy or sustained traffic, require road signs for safety and protection of wild horses and wildlife.

Cultural Resources

1. Ensure that all activities associated with the undertaking, within 100 meters of the discovery, are halted and the discovery is appropriately protected, until the BLM authorized officer issues a Notice to Proceed. A Notice to Proceed may be issued by the BLM under any of the following conditions:

- Evaluation of potentially eligible resource(s) results in a determination that the resource(s) are not eligible;
- The fieldwork phase of the treatment option has been completed; and
- The BLM has accepted a summary description of the fieldwork performed and a reporting schedule for that work.

2. The operator will inform all persons associated with the project that knowingly disturbing cultural resources (historic or archaeological) or collecting artifacts is illegal.

3. The BLM may approve cross-country operations of seismic trucks and support vehicles on bare frozen ground or over sufficient snow depth (vehicle traffic does not reveal the ground) so as to prevent surface disturbance.

4. Perform viewshed reclamation when the setting of a site contributes to the significance of the property.

Paleontological Resources

When paleontological resources of potential scientific interest are encountered (including all vertebrate fossils and deposits of petrified wood), leave them intact and immediately bring them to the attention of the BLM Authorized Officer.

Visual Resources

1. On industrial facilities authorized by the Ely Field Office, utilize anti-glare light fixtures to limit light pollution.

2. During the implementation of vegetation treatments, create irregular margins around treatment areas to better maintain the existing scenic character of the landscape.

3. When feasible, bury utility lines on public land when in the viewshed of residential or community development.

Travel Management and Off-highway Vehicle Use

1. Design access roads requiring construction with cut and fill to minimize surface disturbance and take into account the character of the landform, natural contours, cut material, depth of cut, where the fill material would be deposited, resource concerns, and visual contrast. Avoid construction of access roads on steep hillsides and near watercourses where alternate routes provide adequate access.

2. Where adverse impacts or safety considerations warrant, limit or prohibit public access when authorizing specific routes to areas or sites under permit or lease.

Recreation

1. Do not allow surface or underground disturbance to occur within 100 yards (horizontally or vertically) of known cave resources.

2. Where appropriate, do not allow ground disturbing activities within 100 yards of cave entrances, drainage areas, subsurface passages, and developed recreation sites. Do not dispose of waste material or chemicals in sinkholes or gates by cave entrances. If during construction activities any sinkholes or cave openings are discovered, cease construction activities and notify the BLM authorized officer.

Livestock Grazing

1. Water troughs

- Place troughs connected with spring developments outside of riparian and wetland habitats to reduce livestock trampling damage to wet areas.
- Control trough overflow at springs with float valves or deliver the overflow back into the native channel.

2. Based on allotment situations and circumstances associated with livestock grazing and multiple use management, implement any or all of the following appropriate management practices on winterfat dominated ecological sites.

- Develop grazing systems to control or rest grazing use on winterfat sites after March 1 or when the critical growing season begins. Allow spring grazing use during the critical growing period if a grazing rotation system that provides rest from grazing during the critical growing period at least every other year for all areas is in place. Utilization during the critical growth period should not exceed 35 percent under any circumstances.
- Place salt and supplements at least 0.5 mile away from winterfat dominated sites. Base placement on site-specific assessment and characteristics such as riparian, topography, cultural, special status species, etc.
- Locate sheep bedding grounds and camps at least 0.5 mile away from winterfat dominated sites. Base placement on site-specific assessment and characteristics such as riparian, topography, cultural, special status species, etc.
- Locate water haul sites at least 0.5 mile away from winterfat dominated sites. Base placement on site-specific assessment and characteristics such as riparian, topography, cultural, special status species, etc.
- Construct livestock reservoirs away from winterfat dominated sites. Base placement on site-specific assessment and characteristics such as riparian, topography, cultural, special status species, etc.
- If water wells are approved to be drilled in winterfat dominated sites, strive to pipe the water at least 0.5 mile away from winterfat dominated sites. Base placement on site- specific assessment and characteristics such as riparian, topography, cultural, special status species, etc.

Mineral Extraction

1. Applications for permit to drill would follow the best management practices as outlined in the BLM oil and gas Gold Book (http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html), as well as on-shore regulations, individual surface use plans, and conditions of approval that may be part of the Record of Decision for EISs or Decision Records for environmental assessments/Findings of No Significant Impacts, Documentation of NEPA Adequacy, and Categorical Exclusions prepared for site-specific projects.

2. Do not permit blasting if it would be detrimental to the significant characteristics of archeological or historical values, recreation areas, known caves, water wells, or springs.

3. Notify the BLM authorized officer within 5 days of completion of reclamation work so that timely compliance inspections can be completed.

Watershed Management

1. Manage activities, uses, and authorizations on burned areas to best meet resource management objectives established for the area in specific stabilization, restoration, or activity plans. The BLM authorized officer may open areas to livestock grazing based upon those considerations.

Fire Management

1. Notify valid existing land users (such as mine claimants, holders of rights-of-way, and livestock permittees) prior to implementation of prescribed fires that may affect their investments.

2. Remove vegetation, where appropriate, to protect facilities (e.g., range improvements, communication sites, and recreation sites).

3. Within the area of operation, every effort will be made to prevent, control, or suppress any fire. Fire-fighting equipment may be required to be on site while operations are in progress, depending on hazards inherent in the type of operation and fire hazard levels. Report uncontrolled fires immediately to the BLM Ely Field Office Manager or Authorized Officer. The BLM Fire Dispatch telephone number is (775) 289-1925 or 1-800-633-6092. After working hours, call 911 or the White Pine County Sheriff's Office at (775) 289-8801, the Lincoln County Sheriff's Office at (775) 962-5151, or the Nye County Sheriff's Office at (775) 482-8101.

Noxious and Invasive Weed Management

1. Control or restrict the timing of livestock movement to minimize the transport of livestock-borne noxious weed seeds, roots, or rhizomes between weed-infested and weed-free areas.

2. When maintaining unpaved roads on BLM-administered lands, avoid the unnecessary disturbance of adjacent native vegetation and the spread of weeds. Grade road shoulders or barrow ditches only when necessary to provide for adequate drainage. Minimize the width of grading operations. The BLM Authorized Officer will meet with equipment operators to ensure that they understand this objective.

Health and Safety

1. Consider nozzle type, nozzle size, boom pressure, and adjuvant use and take appropriate measures for each herbicide application project to reduce the chance of chemical drift.

2. All applications of approved pesticides will be conducted only by certified pesticide applicators or by personnel under the direct supervision of a certified applicator.

3. Prior to commencing any chemical control program, and on a daily basis for the duration of

the project, the certified applicator will provide a suitable safety briefing to all personnel working with or in the vicinity of the herbicide application. This briefing will include safe handling, spill prevention, cleanup, and first aid procedures.

4. Store all pesticides in areas where access can be controlled to prevent unauthorized/untrained people from gaining access to the chemicals.

5. Do not apply pesticides within 440 yards (0.25 mile) of residences without prior notification of the resident.

6. Areas treated with pesticides will be adequately posted to notify the public of the activity and of safe reentry dates, if a public notification requirement is specified on the label of the product applied. The public notice signs will be at least 8 1/2" x 11" in size and will contain the date of application and the date of safe re-entry.

7. The recreation permittee will post warning signs at all known mine shafts and other hazardous areas that occur within 100 feet of a race course or pit/spectator area and will verbally inform race participants of all hazards at the pre-race meeting.

8. The recreation permittee will assume liability for and cleanup of any and all releases of hazardous substances or oil (more than one quart) disposed on public land as defined in the National Oil and Hazardous Substances Contingency Plan (Title 40 Code of Federal Regulations Subpart 300). The permittee will immediately notify the BLM Authorized Officer of any and all releases of hazardous substances or oil (more than one quart) on public land.

9. Properly dispose of all tailings, dumps, and deleterious materials or substances. Take measures to isolate, control, and properly dispose of toxic and hazardous materials.

10. Remove and properly dispose of all trash, garbage, debris, and foreign matter. Maintain the disposal site and leave it in a clean and safe condition. Do not allow burning at the site.

11. Do not drain oil or lubricants onto the ground surface. Immediately clean up any spills under 25 gallons; clean up spills over 25 gallons as soon as possible and report the incident to the BLM Authorized Officer and Nevada Division of Environmental Protection.

12. The operator will work with the BLM Authorized Officer on the containment of drilling fluids and drillhole cuttings. Adequately fence, post, or cover mud and separation pits, and hazardous material storage areas.

13. Locate powder magazines at least 0.25 mile from traveled roads. Attend loaded shot holes and charges at all times. Use explosives according to applicable federal and state regulations.

14. Containerize petroleum products such as gasoline, diesel fuel, helicopter fuel, and lubricants in approved containers. Properly store hazardous materials in separate containers to prevent mixing, drainage, or accidents.

Appendix F – Hydraulic Fracturing Technology Paper

BUREAU OF LAND MANAGEMENT
Nevada State Office

Appendix F

Hydraulic Fracturing Technology

This discussion on hydraulic fracturing is derived from the Hydraulic Fracturing (BLM 2013) written and developed by the Bureau of Land Management, Wyoming State Office. It has been modified to meet the criteria for the State of Nevada.

I. BACKGROUND

Hydraulic fracturing (HF) is a well stimulation process used to efficiently maximize the extraction of underground resources – groundwater, oil, natural gas, and geothermal energy. The HF process includes the acquisition of water, mixing of chemicals, surface pressure pumps, production zone fracturing, and HF flowback disposal.

In the United States, HF has been used since the 1940's. Early on, the HF process utilized pressures that are of a much smaller magnitude than those used today.

The HF process involves the injection of a fracturing fluid and propping agent into the hydrocarbon bearing formation under sufficient pressure to widen existing fractures and/or create new fractures. This allows the trapped hydrocarbons an avenue to flow to the wellbore. HF has gained interest recently as hydrocarbons trapped in low permeability or "tight" sand and shale formations are now technically and economically recoverable. As a result, oil and gas production has increased significantly in the United States.

Prior to the development of HF in hydrocarbon bearing tight gas and shale formations, domestic production of conventional resources had been declining. In response to this decline, the federal government in the 1970's through 1992, passed tax credits to encourage the development of unconventional resources. It was during this time that the HF process was further advanced to include the high-pressure multi-stage HF operations being conducted today.

Generally, HF can be described as follows:

1. Water, proppant, and chemical additives are pumped at extremely high pressures down the wellbore.

2. The fracturing fluid is pumped through perforated sections of the wellbore and into the surrounding formation, creating fractures in the rock. The proppant holds the fractures open during well production.

3. Company personnel continuously monitor and gauge pressures, fluids and proppants, studying how the proppants reacts when it hits the bottom of the wellbore, slowly increasing the density of proppants to water as HF progresses.

4. This process may be repeated multiple times, in "stages" to reach maximum areas of the formation(s). The wellbore is temporarily plugged between each stage to maintain the highest fluid pressure possible for the drill casing and to get maximum fracturing results in the rock.

5. The plugs are drilled or removed from the wellbore and the well is tested for results.

6. The pressure is reduced and the fracturing fluids are returned up the wellbore for disposal or treatment and re-use, leaving the proppant in place to prop open the fractures and allow the oil/gas to flow.

II. OPERATIONAL ISSUES

Wells that undergo HF may be drilled vertically, horizontally, or directionally and the resultant fractures induced by HF can be vertical, horizontal, or both. Wells in Nevada (NV) may extend to depths greater than 10,000 feet or less than 1,000 feet, and horizontal sections of a well may extend several thousand feet from the production pad on the surface. Prior to initiating HF, a cement bond log and pressure test is required and evaluated to ensure the integrity of the cement and its bond to both the well casing and the rock facies around the annulus within the geologic formation.

The total volume of fracturing fluids is generally 95-99% water. The amount of water needed to fracture a well in NV depends on the geologic basin, the formation, and depth and type of well (vertical, horizontal, directional), and the proposed completion process.

In general, approximately 25,000 to 350,000 gallons may be used to fracture shallow vertical wells in NV, while approximately 800,000 to 10 million gallons may be used to fracture deep horizontal or directionally drilled wells in NV.

Proppant, consisting of synthetic or natural silica sand, may be used in quantities of a few hundred tons for a vertical well to a few thousand tons for a horizontal well.

Drilling muds, drilling fluids, water, proppant, and HF fluids are stored in onsite tanks or lined pits during the drilling and/or completion process. Equipment transport and setup can take several days, and the actual HF and flowback process can occur in a few days up to a few weeks. For oil wells, the flowback fluid from the HF operations is treated in an oil-water separator before it is stored in a lined pit or tank located on the surface. Where gas wells are flowed back using a "green completion process" fluids are run through a multi-phase separator, which are then piped directly to enclosed tanks or to a production unit. Nevada currently does not have any gas production, but this may change, if gas rich formations are discovered.

Gas emissions associated with the HF process, such as methane, carbon dioxide, and volatile organic compounds (VOCs), are captured when the operator utilizes a green completion process. A "green completion process" is where the operator captures gases at the well head immediately

after the well is completed. Where a green completion process is not utilized, gas emissions associated with the well may be vented and/or flared until "saleable quality" product is obtained in accordance with federal and state rules and regulations. The total volume of emissions from the equipment used (trucks, engines) will vary based on the pressures needed to fracture the well, and the number of zones to be fractured.

Under either completion process, wastewaters from HF may be disposed in several ways. For example, the flowback fluids may be stored in tanks pending reuse; the resultant waste may be re-injected using a permitted injection well, or the waste may be hauled to a licensed facility for treatment, disposal and/or reuse.

Disposal of the waste stream following establishment of "sale-quality" product, would be handled in accordance with Onshore Order #7 regulations and other state/federal rules and regulations.

Fracturing Fluids

As indicated above, the fluid used in the HF process is approximately 95 to 99 percent water and proppants, and 1-5 percent of special-purpose chemical additives. There is a broad array of chemicals that can be used as additives in a fracture treatment including, but not limited to, hydrochloric acid, anti-bacterial agents, corrosion inhibitors, gelling agents (polymers), surfactants, and scale inhibitors. The 1 to 5 percent of chemical additives translates to a minimum of 15,000 gallons of chemicals for every 1.5 million gallons of water used to fracture a well (Paschke, Dr. Suzanne. USGS, Denver, Colorado. September 2011). Water used in the HF process is generally acquired from surface water or groundwater in the local area. Information on obtaining water and water rights is discussed below.

The Nevada Division of Minerals (NDOM) has regulations that require the reporting of the amount and type of chemicals used in a HF operation in "FracFocus" within 60 days of HF completion for public disclosure. For more information concerning FracFocus and HF, refer to the FracFocus website at www.fracfocus.org and the NDOM website at minerals.state.nv.us.

Re-Fracturing

Re-fracturing of wells (RHF) may be performed after a period of time to restore declining production rates. RHF success can be attributed to enlarging and reorienting existing fractures while restoring conductivity due to proppant degradation and fines plugging. Prior to RHF, the wellbore may be cleaned out. Cleaning out the wellbore may recover over 50% of the initial proppant sand. Once cleaned, the process of RHF is the same as the initial HF. The need for RHF cannot be predicted.

Water Availability and Consumption Estimates

According to the Nevada State Water Plan (March 1999), total statewide water withdrawals for NV are forecasted to increase about 9 percent from 4,041,000 acre-feet (af) in 1995 to 4,391,000 acre-feet in 2020, assuming current levels of conservation. Approximately one-half of these withdrawals are consumptively used. This projected increase in water use is directly attributable to Nevada's increasing population and related increases in economic endeavors.

The anticipated rise in total statewide water withdrawals primarily reflects expected increases in public supply for municipal and industrial (M&I) water usage to meet the needs of a growing urban population, with expanding commercial and industrial activities. Nevada's population is projected to reach about 3,047,000 by the year 2020, with about 95 percent of these residents served by public water systems (NDWP, March 1999).

M&I withdrawals currently account for about 13 percent of the water used in NV. About 77 percent of water withdrawals are currently for agricultural use. Annual M&I water use is projected to increase from 525,000 af in 1995 to 1,034,000 af in 2020 (24 percent of total water withdrawals) based upon existing water use patterns and conservation measures. Approximately 6 to 7 percent of statewide water withdrawals occur in the mining industry (NDWP, March 1999).

Interest in obtaining the necessary water supplies for wildlife and environmental needs is increasing. Additionally, the popularity of water-based outdoor recreation continues to grow. It is anticipated that these trends will continue, resulting in increased water supply demands for wildlife, environmental and recreational purposes.

Currently, surface water supplies are virtually fully appropriated. The increase in total statewide demand, particularly M&I water use, is expected to be met via better demand management (conservation), use of alternative sources (reused water, reclaimed water and gray water), purchases, leases or other transfers from existing water users, and by new groundwater appropriations. Much of the state's unappropriated groundwater is located in basins at a distance from urban centers. Thus, increasing attention will be placed on interbasin and intercounty transfers, and implementation of underutilized water management tools such as water marketing and water banking. Water for instream flow purposes, wildlife protection, environmental purposes and recreation will likely be generated by increased conservation and the acquisition of existing water rights (NDWP, March 1999).

Comparison Figures:

- Olympic-sized swimming pool - **660,430 gallons** of water.
- Typical golf course requires **100,000 to 1,000,000 gallons** of water per week in summer to maintain healthy vegetation.
- Average car wash of fresh water uses **9 to 15 gallons** during any given wash cycle.
- Average household in Southern Nevada uses about **222 gallons** of water per day (**81,000 gallons** per year).

Potential Sources of Water for Hydraulic Fracturing

Quality freshwater is required to drill the surface-casing section of the wellbore per Federal regulations; other sections of the wellbore (intermediate and/or production strings) would be drilled with appropriate quality makeup water as necessary. This is done to protect usable water zones from contamination, to prevent mixing of zones containing different water quality/use classifications, and to minimize total freshwater volumes. With detailed geologic well logging during drilling operations, geologists/mud loggers on location identify the bottoms of these usable water zones, which aids in the proper setting of casing depths. Usable water is defined as having

less than 10,000 mg/l of Total Dissolved Solids (TDS). Drinking or potable water is defined as having less than 1,000 mg/l of TDS.

Several sources of water are available for drilling and/or HF in NV. Nevada's water rights system is based on the prior appropriation doctrine; therefore, all use of water, with the exception of domestic wells, requires a permit from the State Engineer (NRS 534.180). Like any other water user, companies that drill or hydraulically fracture oil and gas wells must adhere to NV water laws when obtaining and using specific sources of water.

Below is a discussion of the sources of water that could potentially be used for HF. The decision to use any specific source is dependent on BLM authorization at the APD stage and the ability to obtain water rights. From an operators' standpoint, the decision regarding which water source will be used is primarily driven by the economics associated with procuring a specific water source.

Water transported from outside the state. The operator may transport water from outside the state. As long as the transport and use of the water carries no legal obligation to NV, this is an allowable source of water from a water rights perspective.

Irrigation water leased or purchased from a landowner. The landowner may have rights to surface water, delivered by a ditch or canal that is used to irrigate land. The operator may choose to enter into an agreement with the landowner to purchase or lease a portion of that water. This is allowable, however, in nearly every case, the use of an irrigation water right is likely limited to irrigation uses and cannot be used for well drilling and HF operations. To allow its use for drilling and HF, the owner of the water right and the operator must apply to change the water right through a formal process.

Treated water or raw water leased or purchased from a water provider or municipality. The operator may choose to enter into an agreement with a water provider to purchase or lease water from the water provider's system. Municipalities and other water providers may have a surplus of water in their system before it is treated (raw water) or after treatment that can be used for drilling and HF operations. Such an arrangement would be allowed only if the operator's use were compliant with the water provider's water rights.

Water treated at a waste water treatment plant leased or purchased from a water provider. The operator may choose to enter into an agreement with a water provider to purchase or lease water that has been used by the public and then treated as wastewater. Municipalities and other water providers discharge their treated waste water into the streams where it becomes part of the public resource, ready to be appropriated once again in the priority system. But for many municipalities a portion of the water that is discharged has the character of being "reusable." As a result, it is possible that after having been discharged to the stream, it could be diverted by the operator to be used for drilling and HF operations. Such an arrangement would only be appropriate with the approval of the Nevada Division of Water Resources, State Engineer's Office (NDWR) and would be allowed only if the water provider's water rights include uses for drilling and HF operations.

New diversion of surface water flowing in streams and rivers. New diversion of surface waters in most parts of the state are rare because the surface streams are already fully appropriated, meaning that there is no water available for appropriation. Given the variability of surface water flows in

the State, this may not be the most reliable water source even if there is water available for appropriation.

Produced Water. The operator may choose to use water produced in conjunction with oil or gas production at an existing oil or gas well. The water that is produced from an oil or gas well is under the administrative purview of the NDEP, Underground Injection Control Program (UIC) and is either non-tributary, in which case, it is administered independent of the prior appropriation doctrine; or is tributary, in which case, the depletions from its withdrawal must be fully augmented if the depletions occur in an over-appropriated basin. The result in either case is that the produced water is available for consumption for other purposes, not just oil and gas operations. The water must not be encumbered by other needs and the operator must obtain a proper well permit from the NDWR before the water can be used for drilling and HF operations.

Reused or Recycled Drilling Water. Water that is used for drilling of one well may be recovered and reused in the construction of subsequent wells. The BLM encourages reuse and recycling of both the water used in well drilling and the water produced in conjunction with oil or gas production. However, as described above, the operator must obtain the right to use the water for this purpose.

On-Location Water Supply Wells. Operators may apply for, and receive, permission from the NDWR to drill and use a new water supply well. These wells are usually drilled on location to provide an on-demand supply. The proper construction, operation and maintenance, backflow prevention and security of these water supply wells are critical considerations at the time they are proposed to minimize impacts to the well and/or the waters in the well, water right holders and water-dependent resources. Plugging these wells is under the jurisdiction of the NDWR and BLM.

Authorization of any future proposed projects would require full compliance with local, state, and federal regulations and laws that relate to surface and groundwater protection and would be subject to routine inspections by the BLM and the State of Nevada Commission on Mineral Resources, Division of Minerals Memorandum of Understanding dated January 9, 2006, prior to approval.

III. Potential Impacts to Usable Water Zones

Impacts to freshwater supplies can originate from point sources, such as chemical spills, chemical storage tanks (aboveground and underground), industrial sites, landfills, household septic tanks, and mining activities. Impacts to usable waters may also occur through a variety of oil and gas operational sources which may include, but are not limited to, pipeline and well casing failure, and well (gas, oil and/or water) drilling and construction of related facilities. Similarly, improper construction and management of open fluids pits and production facilities could degrade ground water quality through leakage and leaching.

Should hydrocarbons or associated chemicals for oil and gas development, including HF, exceeding US Environmental Protection Agency (EPA)/NDEP standards for minimum concentration levels migrate into potable water supply wells, springs, or usable water systems, it could result in these water sources becoming non-potable and killing off aquatic species. Water

wells developed for oil and gas drilling could also result in a drawdown in the quantity of water in nearby residential areas depending upon the geology and volumes of water extracted.

Usable groundwater aquifers are most susceptible to pollution where the aquifer is shallow (within 100 feet of the surface depending on surface geology) or perched, are very permeable, or connected directly to a surface water system, such as through floodplains and/or alluvial valleys or where operations occur in geologic zones which are highly fractured and/or lack a sealing formation between the production zone and the usable water zones. If an impact to usable waters were to occur, a greater number of people could be affected in densely populated areas versus sparsely populated areas characteristic of NV. Pollution could also impact usable waters in remote basins where interbasin transfer projects can pump and transport water through pipelines to urban areas, like Las Vegas and Reno. The BLM is also required to analyze potential impacts to aquatic species from groundwater contamination.

Potential impacts on usable groundwater resources from fluid mineral extraction activities could result from the following scenarios:

1. Contamination of aquifers through the introduction of drilling and/or completion fluids through spills or drilling problems, such as lost circulation zones.

2. Communication of the induced hydraulic fractures with existing fractures potentially allows for HF fluid migration into usable water zones/supplies. The potential for this impact is likely dependent on the local hydraulic gradients where those fluids are dissolved in the water column.

3. Cross-contamination of aquifers/formations may result when fluids from a deeper aquifer/formation migrate into a shallower aquifer/formation due to improperly cemented well casings.

4. Localized depletion of perched aquifer or drawdown of unconfined groundwater aquifer. Progressive contamination of deep confined, shallow confined, and unconfined aquifers if the deep confined aquifers are not completely cased off, and geologically isolated, from deeper oil bearing units. An example of this would be salt water intrusion resulting from sustained drawdown associated with the pumping of groundwater.

5. Casing failure (casing ruptures in low pressure formations, casing corrosion)

6. Communication through old abandoned wells nearby

7. Transportation of fluids to and from site (accidents)

8. Wastewater disposal

The impacts above could occur as a result of the following processes:

<u>Improper casing and cementing.</u>

A well casing design that is not set at the proper depths or a cementing program that does not properly isolate necessary formations could allow oil, gas or HF fluids to contaminate other aquifers/formations. In addition, old well casing and casing cement that has corroded over time can fail allowing contaminates to migrate into the well formation.

Natural fractures, faults, and abandoned wells.

If HF of oil and gas wells result in new fractures connecting with established natural fractures, faults, or improperly plugged dry or abandoned wells, a pathway for gas or contaminants to migrate underground may be created posing a risk to water quality. The potential for this impact is currently unknown but it is generally accepted that the potential decreases with increasing distance between the production zone and usable water zones. This potential again is dependent upon the site specific conditions at the well location.

Fracture growth.

A number of studies and publications report that the risk of induced fractures extending out of the target formation into an aquifer allowing hydrocarbons or other fluids to contaminate the aquifer may depend, in part, on the formation thickness separating the targeted fractured formation and the aquifer. According to a 2012 Bipartisan Policy Center report, the fracturing process itself is unlikely to directly affect freshwater aquifers because in Nevada fracturing typically takes place at a depth of 6,000 to 10,000 feet, while drinking water aquifers are typically less than 1,000 feet deep. However, some areas of Nevada, the deep carbonate aquifer can extend to 6,000 feet below ground surface. Recent studies have shown that induced fractures created during HF growing more than 350 meters vertically is less than 1% (Lacazette and Geiser). If a parcel is sold and development is proposed in usable water zones, those operations would have to comply with federal and/or state water quality standards or receive a Class II designation from the NDEP.

Fracture growth and the potential for upward fluid migration, through volcanic, sedimentary and other geologic formations depend on site-specific factors such as the following:

1. Physical properties, types, thicknesses, and depths of the targeted formation as well as those of the overlying geologic formations.

2. Presence of existing natural fracture systems and their orientation in the target formation and surrounding formations.

3. Amount and distribution of stress (i.e., in-situ stress), and the stress contrasts between the targeted formation and the surrounding formations.

Hydraulic fracture stimulation designs include the volume of fracturing fluid injected into the formation as well as the fluid injection rate and fluid viscosity; this information is evaluated against the above site specific considerations**.**

Fluid leak and recovery (flowback) of HF fluids.

Not all fracturing fluids injected into the formation during the HF process are recovered at the surface. Estimates of the fluids recovered range from 15-80% of the volume injected depending on the site (EPA 2010). Fluid movement into smaller fractures or other geologic substructures can

be to a point where flowback efforts will not recover all the fluid or that the pressure reduction caused by pumping during subsequent production operations may not be sufficient to recover all the fluid that has leaked into the formation. Fracturing fluids can remain in the formation due to adsorption and chemical reactions, movement out of the capture zone, inadequate mixing, or from fracture collapse. It is noted that the fluid loss due to leakage into small fractures and pores is minimized by the use of cross-linked gels.

Willberg et al. (1998) analyzed HF flowback and described the effect of pumping rates on cleanup efficiency in initially dry, very low permeability (0.001 millidarcy) shale. Some wells in this study were pumped at low flowback rates (less than 3 barrels per minute (bbl/min). Other wells were pumped more aggressively at greater than 3 bbl/min. Thirty-one percent of the injected HF fluids were recovered when low flowback rates were applied over a 5-day period. Forty-six percent of the fluids were recovered when aggressive flowback rates were applied in other wells over a 2-day period. In both cases, additional fluid recovery (10 percent to 13 percent) was achieved during the subsequent gas production phase, resulting in a total recovery rate of 41 percent to 59 percent of the initial volume of injected HF fluid. Ultimate recovery rate however, is dependent on the permeability of the rocks, fracture configuration, and the surface area of the fracture(s).

The ability of HF chemicals to migrate in an undissolved or dissolved phase into a usable water zone is likely dependent upon the location of the sealing formation (if any), the geology of the sealing formation, hydraulic gradients and production pressures.

HF fluids can remain in the subsurface unrecovered, due to "leak off" into connected fractures and the pores of rocks. Fracturing fluids injected into the primary hydraulically induced fracture can intersect and flow (leak off) into preexisting smaller natural fractures. Some of the fluids lost in this way may occur very close to the well bore after traveling minimal distances in the hydraulically induced fracture before being diverted into other fractures and pores. Once "mixed" with the native water, local and regional vertical and horizontal gradients may influence where and if these fluids will come in contact with usable water zones, assuming that there is inadequate recovery either through the initial flowback or over the productive life of the well. Faults, folds, joints, etc., could also alter localized flow patterns as discussed below.

The following processes can influence effective recovery of the fracture fluids:

Check-Valve Effect

A check-valve effect occurs when natural and/or newly created fractures open and HF fluid is forced into the fractures when fracturing pressures are high, but the fluids are subsequently prevented from flowing back toward the wellbore as the fractures close when the fracturing pressure is decreased (Warpinski et al., 1988; Palmer et al., 1991a).

A long fracture can be pinched-off at some distance from the wellbore. This reduces the effective fracture length. HF fluids trapped beyond the "pinch point" are unlikely to be recovered during flowback and oil/gas is unlikely to be recovered during production.

In most cases, when the fracturing pressure is reduced, the fracture closes in response to natural subsurface compressive stresses. Because the primary purpose of HF is to increase the effective permeability of the target formation and connect new or widened fractures to the wellbore, a closed

fracture is of little use. Therefore, a component of HF is to "prop" the fracture open, so that the enhanced permeability from the pressure-induced fracturing persists even after fracturing pressure is terminated. To this end, operators use a system of fluids and "proppants" to create and preserve a high-permeability fracture-channel from the wellbore deep into the formation.

The check-valve effect takes place in locations beyond the zone where proppants have been placed (or in smaller secondary fractures that have not received any proppant). It is possible that some volume of stimulation fluid cannot be recovered due to its movement into zones that were not completely "propped" open.

Adsorption and Chemical Reactions

Adsorption and chemical reactions can also prevent HF fluids from being recovered. Adsorption is the process by which fluid constituents adhere to a solid surface and are thereby unavailable to flow with groundwater. Adsorption to coal is likely; however, adsorption to other geologic material (e.g., shale, sandstone) is likely to be minimal. Another possible reaction affecting the recovery of fracturing fluid constituents is the neutralization of acids (in the fracturing fluids) by carbonates in the subsurface.

Movement of Fluids outside the Capture Zone

Fracturing fluids injected into the target zone flow into fractures under very high pressure. The hydraulic gradients driving fluid flow away from the wellbore during injection are much greater than the hydraulic gradients pulling fluid flow back toward the wellbore during flowback and production (pumping) of the well. Some portion of the fracturing fluids could be forced along the hydraulically induced fracture to a point beyond the capture zone of the production well. The size of the capture zone will be affected by the regional groundwater gradients, and by the drawdown caused by producing the well. Site-specific geologic and hydrogeologic characteristics, injection pressure, and production pumping details should provide the information needed to estimate the dimension of the production well capture zone and the extent to which the fracturing fluids might disperse and dilute.

Incomplete Mixing of Fracturing Fluids with Water

Steidl (1993) documented the occurrence of a gelling agent that did not dissolve completely and actually formed clumps at 15 times the injected concentration in an induced fracture. Steidl also directly observed gel hanging in stringy clumps in many other induced fractures. As Willberg et al. (1997) noted, laboratory studies indicate that fingered flow of water past residual gel may impede fluid recovery. Therefore, some fracturing fluid gels appear not to flow with groundwater during production pumping and remain in the subsurface unrecovered. Such gels are unlikely to flow with groundwater during production, but may present a source of gel constituents to flowing groundwater during and after production.

IV. Geologic Hazards (including seismic/landslides)

Nevada is the 3rd most tectonically active state in the union. Since the 1850s there have been 63 earthquakes with a magnitude greater than 5.5, the cutoff for a destructive earthquake. Potential geologic hazards caused by HF include induced seismic activity in addition to the tectonic activity already occurring in the state. Induced seismic activity could indirectly cause a surficial landslide where soils/slopes are susceptible to failure. Landslides involve the mass movement of earth

materials down slopes and can include debris flows, soil creep, and slumping of large blocks of material. Any destructive earthquake also has the potential to induce liquefaction in saturated soils.

Earthquakes occur when energy is released due to blocks of the earth's crust moving along areas of weakness or faults. Earthquakes attributable to human activities are called "induced seismic events" or "induced earthquakes." In the past several years induced seismic events related to energy development projects have drawn heightened public attention. Although only a very small fraction of injection and extraction activities at hundreds of thousands of energy development sites in the United States have induced seismicity at levels that are noticeable to the public, seismic events caused by or likely related to energy development have been measured and felt in Alabama, Arkansas, California, Colorado, Illinois, Louisiana, Mississippi, Nebraska, Nevada, New Mexico, Ohio, Oklahoma, and Texas.

A study conducted by the National Academy of Sciences (Induced Seismicity Potential in Energy Technologies, National Academy of Sciences, 2012) studied the issue of induced seismic activity from energy development. As a result of the study, they found that:

1. The process of hydraulic fracturing a well as presently implemented for shale gas recovery does not pose a high risk for inducing felt seismic events; and

2. Injection for disposal of waste water derived from energy technologies into the subsurface does pose some risk for induced seismicity, but very few events have been documented over the past several decades relative to the large number of disposal wells in operation.

However, a more recent study by the U.S. Geological Service has found that at some locations the increase in seismicity coincides with the injection of wastewater in deep disposal wells. Wastewater injection increases the underground pore pressure, which may, in effect, lubricate nearby faults thereby weakening them. If the pore pressure increases enough, the weakened fault will slip, releasing stored tectonic stress in the form of an earthquake. Even faults that have not moved in millions of years can be made to slip and cause an earthquake if conditions underground are appropriate (USGS 2014).

The potential for induced seismicity cannot be made at the leasing stage; as such, it will be evaluated at the APD stage should the parcel be sold/issued, and a development proposal submitted.

V. Spill Response and Reporting

Spill Prevention, Control, and Countermeasure (SPCC) Plans – EPA's rules include requirements for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters and adjoining shorelines. The rule requires that operators of specific facilities prepare, amend, and implement SPCC Plans. The SPCC rule is part of the Oil Pollution Prevention regulation, which also includes the Facility Response Plan (FRP) rule. Originally published in 1973 under the authority of §311 of the Clean Water Act, the Oil Pollution Prevention regulation sets forth requirements for prevention of, preparedness for, and response to oil discharges at specific non-transportation-related facilities. To prevent oil from reaching navigable waters and adjoining shorelines, and to contain discharges of oil, the regulation requires the operator of these facilities

to develop and implement SPCC Plans and establishes procedures, methods, and equipment requirements (Subparts A, B, and C). In 1990, the Oil Pollution Act amended the Clean Water Act to require some oil storage facilities to prepare FRPs. On July 1, 1994, EPA finalized the revisions that direct facility owners or operators to prepare and submit plans for responding to a worst-case discharge of oil.

In addition to EPA's requirements, operators must provide a plan for managing waste materials, and for the safe containment of hazardous materials, per Onshore Order #1 with their APD proposal. All spills and/or undesirable events are managed in accordance with Notice to Lessee (NTL) 3-A for responding to all spills and/or undesirable events related to HF operations.

Certain oil and gas exploration and production wastes occurring at or near wellheads are exempt from the Clean Water Act, such as: drilling fluids, produced water, drill cuttings, well completion, and treatment and stimulations fluids. In general, the exempt status of exploration and production waste depends on how the material was used or generated as waste, not necessarily whether the material is hazardous or toxic.

VI. Public Health and Safety

The intensity, and likelihood, of potential impacts to public health and safety, and to the quality of usable water aquifers is directly related to proximity of the proposed action to domestic and/or community water supplies (wells, reservoirs, lakes, rivers, etc.) and/or agricultural developments. The potential impacts are also dependent on the extent of the production well's capture zone and well integrity. Nevada's Standard Lease Stipulations and Lease Notices specify that oil and gas development is generally restricted within 500 feet of riparian habitats and wetlands, perennial water sources (rivers, springs, water wells, etc.) and/or floodplains. Intensity of impact is likely dependent on the density of development.

VII. Hydraulic Frac Job Data for Nevada.

Operator	Noble Energy	Noble Energy	Noble Energy	Makoil	Grant Canyon
Well	Humboldt M2C-M2-21	Huntington K1L-1V	Humboldt M10C-M10-11	Portugese Mountain 14A	Blackburn #16
Total Base Water Volume (gal)	250,057	300,537	343,919	29,949	209,600
2% KCL Water	88.5614	0	86.45119	0	0
Fresh Water	0	88.9968	0	53.90215	85.2039
Water	1.57645	0.61826	0.81892	0.78169	0.53354
2-bromo-2-nitro-1, 3-propanediol	0.00202	0.00213	0.00358	0.00129	0.00171
Crystalline Silica, quartz	0.65036	8.59936	10.49356	32.39228	14.4277

Ethylene glycol monobutyl ether	0.02379	0.00537	0.01688	0.09718	0.02695
Isopropanol	0.00311	0.00351	0.00221	0.04926	0.00353
Methanol	0.00311	0.00353	0.00226	0.05782	0.00361

* Values are based on the percent of the total mass. These are the most common additives in all the jobs.

VIII. References

BLM. (July 5, 2013). Bureau of Land Management Wyoming State Office: Hydraulic Fracturing White Paper.

EPA June 2010. U.S. Environmental Protection Agency, Office of Research and Development, "Hydraulioc Fracturing Research Study". Website: http://www.epa.gov/ogwdw000/uic/pdfs/hfresearchstudyfs.pdf

Lacazette, A., Geiser, P., Comment on Davies et al 2012 – Hydraulic Fractures: How far can they go?, *Marine and Petroleum Geology* (2013), doi: 10.1016/j.marpetgeo.2012.12.008.

National Academy of Sciences. (June 2012). Induced Seismicity Potential in Energy Technologies--Report in Brief, by Committee on Induced Seismicity Potential in Energy Technologies.

Nevada Division of Water Planning (NDWP). (March 1999). Nevada State Water Plan: Future Water Needs. P. ES-1. http://water.nv.gov/programs/planning/stateplan/documents/NV_State_Water_Plan-complete.pdf

Paschke, Suzanne, Dr. (September 2011). Effects of Development on Groundwater Quality in the Denver Basin, Colorado.

Steidl, P. (1993). Evaluation of induced fractures intercepted by mining, Proceedings 1993 Coalbed Methane Symposium, University of Alabama, pp.675-686.

USGS 2014. U.S. Department of the Interior | U.S. Geological Survey. "Man Made Earthquakes" URL: www.usgs.gov/blogs/features/usgs_top_story/man-made-earthquakes/.

Warpinski, N.R., Branagan, P.T., Satler, A.R., Cippolla, C.L., Lorenz, J.G., and Thorne, B.J. 1988. A case study of a stimulation experiment in a fluvial, tight, sandstone gas reservoir. Society of Petroleum Engineers Paper No. 18258, Proceedings 63rd Annual Technology Conference, October 1988 (Houston), pp. 616-632.

Willberg et al. (1997). Determination of the Effect of Formation Water on Fracture Fluid Cleanup Through Field Testing in the East Texas Cotton Valley.

Willberg DM, Steinsberger N, Hoover R, Card RJ, Queen J (1998) Optimization of fracture cleanup using flowback analysis. SPE 39920. Presented paper. SPE Rocky Mountain Regional/Low-permeability Reservoirs Symposium and Exhibition, Denver CO, 5-8 April 1998.

Appendix G – Greater Sage-grouse Required Design Features (RDFs)

The worksheet below includes a list of design features that would be implemented for all authorized/permitted activities, consistent with applicable law (and consistent with the 2015 BLM Nevada and Northeastern California's Approved Resource Management Plan Amendment, MD SSS 2(C), SSS 3(B), and SSS 4. At the site-specific scale, BLM will document when an RDF is or is not applied to a particular project. If an RDF is not applied, this worksheet provides the BLM an opportunity to consistently document its rationale as to why that RDF if not applicable. This document will be placed in the project record and/or referenced in the project's NEPA analysis.

Project Name: _____ **NEPA #:** _____

General RDFs		Applied	If RDF not applied, select reason:
RDF Gen 1:	Locate new roads outside of GRSG habitat to the extent practical.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. **Rationale if RDF is not applied:**
RDF Gen 2:	Avoid constructing roads within riparian areas and ephemeral drainages. Construct low water crossings at right angles to ephemeral drainages and stream crossings (note that such construction may require permitting under Sections 401 and 404 of the Clean Water Act).	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. **Rationale if RDF is not applied:**
RDF Gen 3:	Limit construction of new roads where roads are already in existence and could be used or upgraded to meet the needs of the project or operation. Design roads to an appropriate standard, no higher than necessary, to accommodate intended purpose and level of use.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. **Rationale if RDF is not applied:**
RDF Gen 4:	Coordinate road construction and use with ROW holders to minimize disturbance to the extent possible.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. **Rationale if RDF is not applied:**
RDF Gen 5:	During project construction and operation, establish and post speed limits in GRSG habitat to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. **Rationale if RDF is not applied:**

RDF Gen 6:	Newly constructed project roads that access valid existing rights would not be managed as public access roads. Proponents will restrict access by employing traffic control devices such as signage, gates, and fencing.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	
RDF Gen 7:	Require dust abatement practices when authorizing use on roads.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	
NO RDF 8 Identified			
RDF Gen 9:	Upon project completion, reclaim roads developed for project access on public lands unless, based on site-specific analysis, the route provides specific benefits for public access and does not contribute to resource conflicts.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	
RDF Gen 10:	Design or site permanent structures that create movement (e.g., pump jack/ windmill) to minimize impacts on GRSG habitat.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	
RDF Gen 11:	Equip temporary and permanent aboveground facilities with structures or devices that discourage nesting and perching of raptors, corvids, and other predators.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	

RDF Gen 12:	Control the spread and effects of nonnative, invasive plant species (e.g., by washing vehicles and equipment, minimize unnecessary surface disturbance; Evangelista et al. 2011). All projects would be required to have a noxious weed management plan in place prior to construction and operations.	☐ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:		
RDF Gen 13:	Implement project site-cleaning practices to preclude the accumulation of debris, solid waste, putrescible wastes, and other potential anthropogenic subsidies for predators of GRSG.	☐ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:		
RDF Gen 14:	Locate project related temporary housing sites outside of GRSG habitat.	☐ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:		
RDF Gen 15:	When interim reclamation is required, irrigate site, in accordance with state laws, to establish seedlings more quickly if the site requires it.	☐ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:		
RDF Gen 16:	Utilize mulching or other soil amendment techniques to expedite reclamation and to protect soils if the site requires it.	☐ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:		

RDF Gen 17:	Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.	☐ Yes ☐ No	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
			☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:		
RDF Gen 18:	When authorizing ground-disturbing activities, require the use of vegetation and soil reclamation standards suitable for the site type prior to construction.	☐ Yes ☐ No	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
			☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:		
RDF Gen 19:	Instruct all construction employees to avoid harassment and disturbance of wildlife, especially during the GRSG breeding (e.g., courtship and nesting) season. In addition, pets shall not be permitted on site during construction (BLM 2005b).	☐ Yes ☐ No	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
			☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:		
RDF Gen 20:	To reduce predator perching in GRSG habitat, limit the construction of vertical facilities and fences to the minimum number and amount needed and install anti-perch devices where applicable.	☐ Yes ☐ No	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
			☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:		
RDF Gen 21:	Outfit all reservoirs, pits, tanks, troughs or similar features with appropriate type and number of wildlife escape ramps (BLM 1990; Taylor and Tuttle 2007).	☐ Yes ☐ No	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
			☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:		

RDF Gen 22:	Load and unload all equipment on existing roads, pull outs, or disturbed areas to minimize disturbance to vegetation and soil.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
			Rationale if RDF is not applied:

In addition to the General RDFs, apply Fluid Minerals RDFs to PHMA, GHMA, and OHMA as appropriate and consistent with applicable law:

Project Name: _____ **NEPA #:** _____

	Fluid Minerals RDFs	Applied	If RDF not applied, select reason:
RDF Lease FM 1:	Co-locate power lines, flow lines, and small pipelines under or immediately adjacent to existing roads (Bui et al. 2010) in order to minimize or avoid disturbance.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
			Rationale if RDF is not applied:
RDF Lease FM 2:	Cover, create barriers, or implement other effective deterrents (e.g., netting, fencing, birdballs, and sound cannons) for all ponds and tanks containing potentially toxic materials to reduce GRSG mortality.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
			Rationale if RDF is not applied:
RDF Lease FM 3:	Require installation of noise shields to comply with noise restrictions (see Action SSS 7) when drilling during the breeding, nesting, brood-rearing, and/or wintering season. Require applicable GRSG seasonal timing restrictions when noise restrictions cannot be met (see Action SSS 6).	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
			Rationale if RDF is not applied:
RDF Lease FM 4:	Ensure habitat restoration meets GRSG habitat objectives (Table 2-2) for reclamation and restoration practices/sites (Pyke 2011).	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
			Rationale if RDF is not applied:

RDF Lease FM 5:	Maximize the area of interim reclamation on long-term access roads and well pads, including reshaping, topsoil management, and revegetating cut-and-fill slopes.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	
RDF Lease FM 6:	Restore disturbed areas at final reclamation to the pre-disturbance landforms and meets the GRSG habitat objectives (Table 2-2).	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	
RDF Lease FM 7:	Use only closed-loop systems for drilling operations and no reserve pits within GRSG habitat.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	
RDF Lease FM 8:	Place liquid gathering facilities outside of GRSG habitat. Have no tanks at well locations within GRSG habitat to minimize vehicle traffic and perching and nesting sites for aerial predators of GRSG.	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	
RDF Lease FM 9:	In GRSG habitat, use remote monitoring techniques for production facilities and develop a plan to reduce vehicular traffic frequency of vehicle use (Lyon and Anderson 2003).	☐ Yes ☐ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	

RDF Lease FM 10: Use dust abatement practices on well pads.	☐ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
	☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
		☐	A specific RDF will provide no additional protection to GRSG or its habitat.
	Rationale if RDF is not applied:		
RDF Lease FM 11: Cluster disturbances associated with operations and facilities as close as possible, unless site-specific conditions indicate that disturbances to GRSG habitat would be reduced if operations and facilities locations would best fit a unique special arrangement.	☐ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
	☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
		☐	A specific RDF will provide no additional protection to GRSG or its habitat.
	Rationale if RDF is not applied:		
RDF Lease FM 12: Apply a phased development approach with concurrent reclamation.	☐ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
	☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
		☐	A specific RDF will provide no additional protection to GRSG or its habitat.
	Rationale if RDF is not applied:		
RDF Lease FM 13: Restrict pit and impoundment construction to reduce or eliminate augmenting threats from West Nile virus (Dougherty 2007).	☐ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
	☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
		☐	A specific RDF will provide no additional protection to GRSG or its habitat.
	Rationale if RDF is not applied:		

RDF Lease FM 14:	In GRSG habitat, remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues, use the following steps for reservoir design to limit favorable mosquito habitat (Doherty 2007): • Overbuild size of ponds for muddy and non-vegetated shorelines • Build steep shorelines to decrease vegetation and increase wave actions • Avoid flooding terrestrial vegetation in flat terrain or low lying areas • Construct dams or impoundments that restrict down slope seepage or overflow • Line the channel where discharge water flows into the pond with crushed rock • Construct spillway with steep sides and line it with crushed rock. • Treat waters with larvicides to reduce mosquito production where water occurs on the surface	☐ Yes	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐ No	☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	
RDF Lease FM 15:	Consider using oak (or other material) mats for drilling activities to reduce vegetation disturbance and for roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment following drilling.	☐ Yes	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐ No	☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____
			☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale if RDF is not applied:	